THE AMERICAN SCHOOL AND UNIVERSITY

A YEARBOOK DEVOTED TO THE DESIGN, CONSTRUCTION, EQUIPMENT, UTILIZATION, AND MAINTENANCE OF EDUCATIONAL BUILDINGS AND GROUNDS

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Foreword

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AFTER an examination of the material of this yearbook, I am convinced that the leaders in public education need to turn more and more to those authorities who give the best of thought, experience, and study as contributions to their field of work. Much of the progress of America has been brought about by the pioneer thinkers, followed up by developers who understood how to put ideas into action. Ideas in action have had most to do with the speeding up of the advance of civilization, especially when they have been applied to some practical service of mankind. Ideas are in this day the most effective weapons both of defense and offense. Public education, along with some of the other real issues of American life, is being challenged by certain selfish groups. Certainly, this is the time when the leaders of public thought who desire to serve some worthy cause should know and use the best ideas available.

I LIKE this yearbook because it is devoted to planning. Planning is one of the elements of making ordered progress. Those who make or appraise the plan must have vision, must know definitely the purpose and the fitness of the plan to serve this purpose. In addition, they must know and understand the service to be performed. This yearbook is so planned as to make available the contributions of some of our best thinkers in their special fields of work. We need the skilled technicians to assist us in the development of our school organization and management. They become educational statesmen in the same sense as do the school executives as they guide us in proper appraisal, as well as in proper development, of those improvements which enrich the educational program.

MOREOVER, I am much interested in the efficiency in service which may be added to the planning of the educational program, but I am also hoping that we shall find a way to conserve in the school plant and its equipment those elements of beauty and artistic appeal which create and stir the right emotions of those who live in the environment of our educational institutions. Wise economy, sensible simplicity, practical flexibility, and ease of adaptability are necessary characteristics of the new and evolving school plant; yet all of these features must be reduced and related to the maximum service with minimum waste planned in terms of service to the group that is to enjoy rather than only be housed in the structure. Nothing should be put into the building or its fixtures which limits the activities, makes more rigid the organization, or retards the growth and development of right emotions and appreciations. The use of the school building must be integrated with the purposes, the life, and the happiness of the group to be served.

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Section I

PROBLEMS OF PLANNING AND FINANCE

Who Shall Finance the Public Schools?

I. The Case for Federal Participation

BY JOHN K. NORTON

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CONTRARY to popular belief, the participation of the Federal Government in financing education involves no fundamentally new issue either in theory or in practice. Washington repeatedly urged the nation to establish a national university, to be attended by young men from every state, and left a legacy in his will for this purpose. Madison's Journal suggests that in the constitutional debates education was accepted as a matter of federal interest and was considered a proper area for federal activity under the welfare clause of the Constitution. Jefferson, Madison, Monroe and other founders of the nation in various state papers recognized the financial support of education as a proper function of the Federal Government.

Actually, the policy of granting federal aid for education antedates the Constitution. Beginning with the ordinance of 1785 and throughout the nineteenth century, the Federal Government distributed lands, and later money, for the support of various forms of education. Decisions of the Supreme Court of the United States clearly indicate that the policy of granting federal aid to education is not violative of the Constitution.

Federal financial support of education is constitutional. It can be justified by the best of historical precedents. The strongest case for such a policy, however, rests on present-day, rather than past, considerations.

Federal Aid Evens the Financial Burden

The states differ greatly in their ability to support schools. Some states have seven times as much wealth and income per child as have other states. The recent federal survey of school finance reveals that even if the less favored states make the maximum effort to support education which it is practical to expect, millions of children will continue to be denied reasonable educational opportunities.

This situation results from the type of economic organization which has developed in this country. Taxable wealth is no longer widely and comparatively evenly distributed in the form of tangible property. It now resides in a variety of intangible forms, which it is difficult for a state to tax. It tends to concentrate in certain strategic areas.

The federal is the only governmental unit capable of dealing with this situation in an effective manner. Under the Sixteenth Amendment, it levies income and other modern taxes without regard to state and local boundaries. It finds it practical to raise funds to finance the enterprises it deems important.

Two developments of recent decades have come to a head during the depression, which vitally affect the financing of all local and state government, including education. The general property tax has broken down in many localities, and in some whole states. The Federal Government has preëmpted a number of modern taxes which are thereby rendered less available as state and local sources of revenue. The Federal Government will continue to levy these taxes, both because it needs revenue for important services which our complex civilization demands, and because it can levy and collect these new taxes more effectively than the states and localities.

In this situation one has two choices. He may conjure up the bugaboo of federal control and superciliously urge that education can be properly financed if the states will set their houses in order, even though the facts testify otherwise. Or, he may realistically recognize that even in 1929 educational support was at a deplorably low level in many areas, that under the stress of the depression it has almost ceased to exist in some communities, and that federal support is essential to the adequate financing of this important service.

Education Is of National Concern

A century ago there might have been a shred of excuse for looking upon education as solely of local concern. Such an attitude is no longer defensible. Every decade finds the nation assuming new duties by the majority vote of the representatives of the people. This is true whether a

Republican or a Democratic president occupies the White House. Why does this trend continue? It continues because each year we become more of a nation. Forces have been released, and problems have arisen which can be dealt with only on a national level.

Whether we like it or not, Congressmen from the West and South are voting, and will continue to vote, on laws that directly and intimately affect New Yorkers; and Congressmen from New York will continue to vote on acts that govern the citizens of these other sections. There is no escape short of abandoning much of what we call civilization. Intelligence consists in facing the facts and in cooperatively developing educational arrangements which will most surely guarantee that all citizens, whether they live in the North or in the South, in the East or in the West, will have sufficient intelligence and good-will to send competent and socially-minded representatives to Washington.

Economically, it is to the advantage of all of us that education should operate effectively throughout the nation. Competent economic authorities such as Thomas Nixon Carver have clearly analyzed the conditions which make "a national educational policy an economic necessity."

Our Interdependent Economic Organization

It is not only politically and economically wise for the Federal Government to aid the states in supporting education—it is fiscally just. Tax revenue is derived from income. Income, in turn, results from far-flung economic activity. The control of wealth tends to concentrate in certain areas, but it is not a corollary of this fact that wealth results from the peculiar virtue, especial intelligence, or unusual industry of the people who happen to reside in these strategic areas. These areas are the products of our far-flung and interdependent economic organization. They are not the creations solely of the fortunate individuals who happen to live in them. No one in possession of the facts would call the Metropolitan Life Insurance Company, with policy-holders in every state of the Union and every country of the world, and income of nearly a billion dollars a year, a local or state corporation. Yet for tax purposes it is so treated, except when the Federal Government is concerned.

In these considerations, we find abundant justification for federal financial assistance in supporting education. All wealth, being in some degree the result of national economic activity, should bear its just share of the cost of supporting enterprises which are of national concern. Few enterprises are of greater concern to the nation as a whole than education. Every dollar of wealth, no matter where it may be located, should bear its just share of the cost of educating every child, no matter where he may happen to live.

This proposal represents no fundamentally new doctrine. For nearly a century we have accepted the principle that the wealth which a child's father happens to possess should not be the factor which determines whether the child is to go to school or to be illiterate. The citizens of a city or county pay for the education of all children in the community.

It has long been recognized in theory, and is increasingly being recognized in practice, that the same principle applies to the state as a whole. All citizens of a state assist, according to their ability, in paying for the education of all children in the state.

Conditions have now developed which require that this principle should be applied to the nation as a whole. No new principle is involved. Rather, we are merely preserving, under changed conditions, the equality of educational opportunity, which both in its origin and in its development is perhaps the most distinctively American principle in existence.

Financial Aid by the Nation—Educational Control by the States

The time has come to proclaim the principle of a national minimum or foundation program of financial support for the education of every child who lives under the American flag. This foundation provision for the support of education should be financed jointly by the nation and the states, under arrangements which require all states to contribute according to their tax-paying ability. We can no longer contemplate without concern the startling disparities in educational opportunities and cultural well-being, which exist between different communities in this nation. These disparities were great in 1929; they are greater today. In the absence of federal financial assistance for education, they promise to become still greater. Dangerous political and social consequences would follow the crystallization of a situation in which the most extreme differences exist in the character of the educational opportunity offered children in different sections.

There are those who oppose federal aid for education because they fear federal control of education. The partial financing of education by the nation need not involve control over its purposes and procedures. A century-and-a-half of experience has revealed that it is possible for the Federal Government to grant aid for the support of education without assuming control over education. National financial interest in education need not and should not involve a weakening of the vital principle that education is a matter for state responsibility and local management. In fact, state control and local management of our schools can be effective, so far as financial support is involved, only if the nation is brought into the situation.

The next fifty years will reveal that the real issue in this whole question is not whether we shall have federal aid for education, but in what form we shall have it. Conditions have already compelled the Federal Government to recognize

its financial interest in education. More than $150,000,000 of federal funds was actually distributed to the states in 1933-34 for the support of education, under both permanent and emergency acts. Some of these acts lean towards federal control; others do not involve such control. Whether the further development of the policy of federal aid for education will mean federal control over education will in large degree depend upon the leadership of the nation. If those who determine policies understand the principles and procedures under which the Federal Government may assist education without controlling it, they can guide future developments in this field in the right direction.

Let us forget our nineteenth century provincialisms and face this situation as realists. Let us insist that the Federal Government shall aid the states in developing a foundation program of financial support for education. Let us at the same time insist that education, so far as the determination of its purposes and its management are concerned, shall be left in the hands of the states and the localities.

II. Minimum Standards Which State Aid Should Assure

BY GEORGE DRAYTON STRAYER

EDUCATION is a function of the state. Tax-supported schools should provide an equalized opportunity for all the children of all the people. In state constitutions and in statutory law we have sought through state support to equalize the burden of financing at least a reasonable fundamental program of education in all local areas. The determination of the amount of money to be expended by the state is dependent in considerable measure upon the minimum program which the state guarantees.

Methods of State Support of Schools

There are many ways in which the several states have sought to make good their obligation to support education. In some cases money has been distributed upon the basis of the number of pupils enrolled in local school areas. This plan obviously has not been successful, for the financing of the minimum program is dependent upon the relative degree of ability of the local community, which is not taken into account when money is distributed on a per-pupil basis.

In more recent years in several of the states moneys have been distributed in such manner as to provide at least a minimum of education in all communities without requiring any one of them to burden itself more than another in the levying of the taxes necessary to provide the school funds. According to this method of support, which measures the local need for support and the local ability to pay the bill, the poorer the community, the larger the contribution from the state. This is as it should be.

Requirements of the Past and the Present

But the question still remains: What is a minimum or standard program which the state should guarantee? What sort of program is considered necessary for the preparation of all boys and girls for citizenship in the state? Obviously, schools in which reading, writing and arithmetic were taught to young children one hundred years ago could not possibly be accepted as meeting the requirements of the situation today. School education in those earlier days was supplementary to a much more significant education carried on by the family and in local community enterprises. Children worked with their fathers and mothers and with their older brothers and sisters. They were inducted into their responsibilities as citizens through cooperation with their elders in providing the labor necessary for many community enterprises and in actual participation in those discussions which resulted in local governmental action. In this earlier period each local community was in large degree self-sustaining.

All this has changed. The greatest disparities exist among the local areas responsible for the development of a program of education. All boys and girls need education beyond the elementary school. High school education in the more sparsely settled areas can be developed adequately only upon the basis of the transportation of children from their homes to the school. And education cannot stop with the high school. There is need everywhere for a program of education which will make possible re-training for those who must change their occupations. There is a crying need for education of all adults in the field of economic, social and governmental problems as well as in the adequate use of leisure time. This broadened program of education can be carried out only upon the basis of state support.

Meeting Individual Needs

Even in the elementary schools the modern program of education is quite different from that which was characteristic of our early society. We can no longer rest satisfied with the mastery of the tools of learning—as important as this function of the school is. We must have teachers who are able to adjust themselves to the varying interests of all boys and girls. They must be prepared to help these children to develop high standards of taste and appreciation, of social un-

derstanding, of wholesome social attitudes and habits.

The modern school system must make vastly better adjustment to the needs and capacities of individual children than was formerly done. We need more adequate opportunities for the atypical. There is urgent need for competent guidance for those whose social environment tends to nullify the work of the school. Health education and recreation have become a significant part of the school program. In rural areas we still have the problem of providing for the transportation of pupils, the erection of larger units of attendance and administration, and the development of a program of education comparable to that enjoyed in the cities.

On the secondary school level we have not yet satisfied the requirements for guidance based upon a case study of the individual's abilities and interests and the possibility of later active participation in the work of the world, dependent upon the distribution of workers in the several occupations. We may not legitimately propose the exclusion of boys and girls from the opportunities of secondary education when society decrees that they may not be employed during the period of adolescence.

The Broad Program of Today

With a complete cross-section of all our population enrolled in high schools, we have the obligation to vary the opportunities provided in such manner as to make available stimulating training for those who are to be leaders as well as for those who are to be followers. The welfare of the state demands that education in technical and professional schools, as well as in the liberal arts, be provided for those who may contribute to the welfare of society upon the basis of the opportunities provided for them in higher education.

As has already been suggested, a significant program of education is needed beyond the period of regular school attendance. Continuation schools for boys and girls who have completed their day-school courses; opportunities for rehabilitation for those injured in industry; re-training for those who lose their jobs through technological development; a broad program of adult education which will make possible better appreciation of our society and a greater opportunity for creative effort and recreation for our adult population—all are needed. We may not hope for security or for liberty except upon the basis of an enlightened public opinion, and we cannot trust the education given during the period of childhood and adolescence to furnish a sound basis for the guidance of adults in our modern society, under existing social and economic conditions.

To summarize, the state's minimum program must include better elementary schools, more adequately staffed, better housed, with more complete equipment of books and educational supplies, and taught by men and women with broad professional preparation. In the secondary field there must be a thoroughgoing revision of our curricula in order that significant opportunities may be provided for the total population of boys and girls of high school age. This program can be carried out only upon the basis of the transportation of children in rural areas, the construction of adequate high school buildings, the installation of a great variety of equipment, the generous supply of books and other educational material necessary for the conduct of a greatly varied program. In the rural areas as well as in the cities the program of education for young people who have completed high school and for adults is just as certainly an obligation of the state as is the opportunity provided in the elementary school. Minimum standards are being worked out in terms of the certification of teachers, the standards for buildings and equipment, the development of courses of study and of curricula, the provision of transportation, and the like.

We can probably find a satisfactory measure of cost for the maintenance of these standards by taking the cost of the program as provided in the community of average wealth maintaining a modern program of education. Having once determined the cost of such a program, it becomes the obligation of the state to measure the need of each community for the services of education and its ability to pay the bill. In each local area the difference between the amount which can be raised by a uniform effort throughout the state and the cost of the fundamental program must be provided by state funds. It is in this way that the burden of supporting the fundamental program of education guaranteed by the state can be equalized.

We must maintain faith in our schools. We have no other institution or agency which can so certainly develop the ideals and the understanding necessary for the preservation of our liberties. The schools must help to build a race of men who find their greatest satisfaction in working together for the common good. All that we can vision of a better society and of a more abundant individual life can be accomplished through education. The obligation of the state is to this generation and to our posterity. The ability of the state will be measured not merely by her economic resources, but also by the devotion of her citizens to the development of a society in which equality of opportunity and social justice shall prevail.

III. High Standards for Solvent Municipalities

BY S. M. STOUFFER

SUPERINTENDENT OF SCHOOLS, WILMINGTON, DEL.

PRINCIPLES governing the preparation of standards for buildings and equipment in solvent municipalities are presented herewith under five general classifications. The first four need to be formulated before the fifth can function efficiently and effectively. The philosophy and program of education, the definition of physical accommodations needed for each type of activity offered, the formulation of a comprehensive long-term building and equipment program, and the development of a similar repair and maintenance program, all contribute toward the creation of an optimum learning situation for every child.

Owing to the varying abilities of even so-called solvent municipalities to support a modern program of education, and owing to the varying types of educational activities that different communities require, the detailed standards should be prepared in terms of the local situation. Because of this fact there is presented under each of the five classifications a brief outline stressing the major points which the standards should include, rather than a series of detailed specifications. Emphasis is placed upon long-term planning and the exercise of foresight rather than upon a rigid, inflexible, dogmatic statement of practices that might function well in one community but not in another.

Philosophy and Program of Education

Any standards must of necessity be based upon a philosophy of education which in turn determines the educational program of the school system. Without a philosophy of education, no motivation, no directing forces and no constructive policies would be possible—the school system would drift aimlessly. The educational philosophy should establish the terminal point or goals of the educative process. The vehicle of achievement is the educational program. As such the educational program should define the areas of instruction and the subject matter fields to be taught in terms of the accepted educational philosophy. These should be allocated to the various segments of the school system, such as elementary schools, special classes, junior and senior high schools.

Likewise, the question of offering the entire program in all sections of the city should be studied to determine whether the need for all types of activities is sufficient to warrant offering them in all schools, or whether one or more centers will be sufficient to provide adequate opportunities for the entire city. The educational program should define the size of the instructional unit; that is, it should indicate the optimum number of children that should be enrolled in any classroom, shop, laboratory, etc., of a given type if maximum instructional efficiency is to be insured. The educational program should likewise designate which features of the program are to be placed in immediate operation, and the plans for future installation of the other features.

Definition of Physical Accommodations

The physical accommodations, both for buildings and for equipment needed to create an optimum learning situation for each type of activity, should be defined in detail. This means, briefly, that the number of square feet per pupil, the size of the room, and the amount and kind of equipment to be used in each type of instructional unit, should be clearly specified. Model plans showing the placement and arrangement of furniture or other equipment, blackboards, storage space, teachers' closets, radiators, windows and lighting facilities, should be prepared for each type of educational offering. At the same time a statement of the equipment and building facilities for the auxiliary and non-instructional features, such as teachers' rooms, offices, toilets, and locker facilities should be formulated. This definition should be made in terms of the type of activity rather than in terms of buildings. On the basis of these standards, the statement of need for any given building can be readily developed.

The Formulation of a Long-Term Building and Equipment Program

The data from the statement of the educational program will supply information on what is to be taught, where it is to be taught, and when it is to be taught. The degree to which present plant facilities meet the optimum teaching situation should be determined by analyzing the available buildings and equipment in terms of the standards developed. This should be done for each type of educational offering. Out of the analysis and study of the data derived from these two sources the order of imperativeness of need should be determined and a long-term program should be developed. In some cases it is possible that major repairs or remodeling will serve the purpose for a temporary period. In other cases new buildings and equipment will be the only answer. The articulation between the building program and the educational program should be such that necessary facilities for any planned activity that are unavailable or inadequate at the time of such planning will be available at the time the proposed educational activity is to be installed. A schedule should be formulated in terms of this requirement.

The site program for immediate and anticipated future needs should be completed concurrently with the building program. The first step is the determination of the ideal location for each type of building. After this it is necessary to determine what sites are available. In some cases it may be necessary to purchase the site immediately; in others an option will be sufficient; and in still others the mere statement of location will be adequate. The important points are: a definite decision as to the location of the proposed building; and assurance that a site of proper size will be available at the time of the construction of the building.

Development of a Long-Term Comprehensive Repair and Maintenance Program

Parallel to and closely coordinated with the building program is the formulation of a long-term comprehensive repair and maintenance program. The items included in this program should be those that are subject to periodic attention if the capital investment is to be preserved and if costly and unnecessary depreciation of the plant and equipment is to be prevented. It includes those items that would become more or less routinized. For example, a schedule should be drawn up indicating for each building how often the classroom and corridor walls should be redecorated. In like manner similar schedules should be made up for the floors, walls, equipment, heating and plumbing facilities, brick and masonry work, and any other elements that require periodic attention. This would make automatic the compilation of budgetary estimates for this type of work. Through such planning, if carefully done, the most necessary periodic repairs would not be overlooked, and many unnecessary outlays of public funds would be prevented.

Creation of Optimum Learning Situation for Every Child in Each Type of Educational Activity Offered

The school system should create the optimum learning situation for every child in each type of educational activity offered. This means that each child should have a seat in a clean, safe, sanitary, well-lighted, well-heated building. It means that the enrolment in any instructional unit should not exceed the maximum defined in the educational program. It means that each classroom, shop or laboratory should have all the equipment and furniture necessary to insure maximum educational advantages. It further means that every child should be given all the textbooks, supplies, supplementary and other instructional material that will enable him to secure the maximum profit from his school life.

In the performance of this duty the school system is exercising true economy, immediate and ultimate. The immediate savings are in the maximum utilization of the teaching corps. Between 70 and 80 per cent of the annual budget is ordinarily appropriated for teachers' salaries. Any makeshifts in buildings and equipment, any overcrowding, any obsolete textbooks, any lack of supplies or other necessary instructional materials, serve to handicap the teacher in her work. During the past few years these items have been cut all out of proportion to the rest of the budget. The textbooks, instructional supplies, maintenance and repair items in the budget have been slashed ruthlessly. Construction of new buildings, of which only a small fractional part of the total cost is chargeable to any one year, has practically stopped. One reason why teachers feel overloaded and overworked is the denial of the necessary instructional tools at the time when they most need them. Even an allowance of $1.50 to $2.00 per pupil for textbooks would go a long way toward lightening the burden. The apparent savings that could be effected as the result of any unwise curtailment in the use of these items could not begin to offset the loss in the major portion of the school budget that goes toward the payment of teachers' salaries.

Ultimately, the price paid for this lack of foresight will be measured in terms of the quality of citizens in the next generation. Education is a continuous process that does not await the return of prosperous times. Children learn new facts and develop new attitudes and abilities every day. Without the proper aids to the learning process, there is grave danger that these learnings will not be developed to the maximum and that the children will acquire half-truths and untruths.

There is also grave danger that they will not have a complete basis for interpreting the ever-changing social order in which we live, and will be lacking in ability to function effectively as citizens. A society composed of individuals so trained cannot long endure. It will degenerate under the pressure of its own inaptitude and inability to identify and use effectively the available instruments of social progress. This is the ultimate economy in the immediate creation of an optimum learning situation for every child in every type of educational activity offered in the educational program.

Two Building Programs—A Contrast

BY H. R. KONRAD

SUPERVISING PRINCIPAL, PORT CARBON, PA.

LESS than a decade ago, the writer was the Principal of a two-teacher high school. The control of the school was vested in a joint board consisting of the boards of the borough and the township which together supported the school. In the township there were sixteen one-room schools. In the borough there was a two-teacher elementary school. The high school was formed through the efforts of the State Department of Public Instruction and had been in existence for two years prior to the experience described in this article. The curriculum was that of the old-fashioned college preparatory course and covered the first three years of the high school course.

At the end of the third year, the Board discovered that they had a new problem to face. The graduates of the new high school wished to take a fourth year. Most of them went to the neighboring city for this work, and the tuition bills were paid by the local district. However, some of the most talented of the children did not find it possible to obtain transportation to the city high school. Each year the tuition bills became higher and the country children had a hard time finding themselves in the new city school environment.

The Board considered the possibility of extending their course to include the four years and decided to make application to the State Department for a four-year classification. The representative who visited the district reported that a new high school building was the first requisite and that a step should be taken towards consolidation of the sixteen one-room schools. The Board were willing to consider the new construction, but on the question of consolidation they were very undecided. No attempt was made to determine the exact school conditions in the one-room schools, and no survey was made of the entire situation. By a series of conferences, a compromise was effected whereby the Board would erect a new high school building and would agree to transport the seventh and eighth grades from two of the more congested schools to the new high school. Overtures leading to the organization of a junior high school were rejected over the protest of the Principal.

The Casual Procedure of the Board in the First Instance

The Board did not desire to have the trouble of a bond election, with the possibility of defeat. They ascertained the borrowing capacity of the two districts without an election and voted to erect a building at a cost not to exceed this sum. They had no attorney, so they selected one because of his relationship to a prominent family in the community. He attended to all the details of the issue and of the sale of the bonds. He made no effort to get more than par for the bonds, even though other issues were selling at a premium at the time.

The next step was the election of an architect. There were only three applicants, for the Board had not made any efforts to interest any architect in the project. The man selected had built one small school and remodeled another. He was an authority on factory construction, so the Board felt that he would be economical. After he had signed a contract, he was informed of the finances of the district, and he asked how many rooms he could plan and cause to be erected for that sum. He was told that the Board had no very definite ideas, save that the Principal had stated that there should be a minimum of corridor space and that there ought to be a gymnasium. To this the architect added that two rooms should be separated by folding doors so that the school would have an assembly room. He drew a rough sketch, and the Board told him to proceed along those lines. Owing to pressure from the State School Buildings Department, these plans were modified three times.

The plans were then completed and bids invited. A firm of local carpenters were the low bidders. They had remodeled the school mentioned above and felt that they had had considerable experience in school construction. At this time the Principal began to feel that his own idea of school administration was somewhat hazy and he began to read some professional literature. The following summer found him at a teachers college. In his absence, the Board purchased pupil desks from a friend of one of the directors. They told the salesman to make the usual assortment of sizes, and as a result he sent some desks so small that no high school pupil could use them. The contractor was very slow in getting the building finished. There was no liquidated damages clause in his contract, consequently the Board started to use part of the new building long before it was really completed.

An effort was made by the Principal to change the school from the traditional school to a vocational high school, but the effort was made too late. The Board had already determined to continue on the old path, especially since one of the directors had two sons who were intending to study for professions when they had completed the high school and college courses. However, the State Department, on being appealed to, furnished the school with an agricultural teacher for a half-day each week. Since there was no expense involved, the Board made no objections to this arrangement.

Studying the New Situation

The Principal continued his studies at the teachers college each summer and eventually was elected Supervising Principal of a larger district in another part of the state. The first problem he had to face was the erection of a new high school building. He realized that the program could be a success only if he utilized the past experience of other school men. Instead of jumping into the new situation blindly, he informed the new Board that he would need two months to study the situation and that he would make a report to the Board at the end of that time. He gathered all the pertinent data and then went to the State Capitol, where he worked out the problem with the assistance of the experts of the State Department. The surveys were completed and a statement of need drawn up. At the suggestion of the Department, the Principal persuaded the Board to spend a day at the Department, conferring with the various experts. The results of the conferences were shown in the determining of the following policies:

The educational program of the school was to be revised to meet the needs of the individual children.

The organization of the school was to include a fully developed junior high school.

The size of the building was determined in terms of future rather than present needs.

A definite policy was determined in connection with the financial program.

At the next Board meeting, the statement of need was presented and adopted, since it agreed with the policies of the Board. About this time the Board and the Principal were literally besieged by architects who wished to stage a competition for the job. They offered to make any number of studies and sketches without any obligation on the part of the Board. On the advice of the Principal all these offers were rejected and the State Department was requested to send one of its school architects to the community to approve the site and make some sketches. The Department sent one of its best men, who spent two days and the major portions of two nights with members of the Board, drawing for them sketches embodying the various ideas they had in mind and pointing out weak and strong points. Finally, sketch M seemed the most desirable. The next month was spent by the Board visiting new buildings in that portion of the state. They were observing desirable and undesirable details in each building, and they were forming their opinions as to the skill of the various architects. As a result, three architects were invited to appear before the Board for an interview. The architect selected from these three was chosen on the basis of his training, previous school planning experience, the completeness of his staff, and his reputation for integrity.

Immediately upon his selection, he was given sketch M mentioned above and instructed to use that as a base for his study. He was not to be limited to the one idea, however. His study developed a better orientation of the building on the site and made the structure more compact without losing any educational efficiency for the building. He also submitted estimates of cost for the erection of each of the buildings he had sketched. The costs were all more than the Board could afford, and the architect recommended that parts of the building be left unfinished instead of curtailing the size of the building or substituting cheaper materials. He proposed to include enough alternates in his bid proposals so that the Board could finish as much of the building as their finances would permit.

In the meantime the Principal worked out a statement of the equipment needs of the new school and submitted the list to three representative equipment firms with a request for a preliminary estimate on the total cost. He received itemized estimates from each of the firms and was able to present the Board with a careful estimate of the cost of equipment. He also worked out the financial program and with the assistance of the entire Board informed the community by every possible means of the educational needs, the proposed educational program, the building program, and the proposed bond issue. In the meantime, the Principal arranged a conference of the Board with a state official who helped crystallize the thinking of the Board on financial matters. As a result, after the electors had approved the bond issue by a vote of three to one, on the same day that a neighboring community defeated a similar proposal by a vote of two to one, the Board decided to issue serial bonds payable within twenty-three years in such a way that the annual debt service payment would be equalized.

In due time the architect presented preliminary sketches, which were carefully studied by the Principal and the Board. Working drawings were prepared and approved by the various state agencies. After the legal advertising and bidding procedures, the contractors were selected and the building operations started. The Board felt very well pleased with their efforts at getting complete plans when they found from month to month that the extra costs on the building were a very minor item; in fact, on one of the major contracts there was not a single extra throughout the entire construction. The usual building delays appeared, and while the Board tried to hurry up the contractor, they made no effort to collect liquidated damages, feeling that they would rather wait a few weeks for the building than get an imperfect job.

Careful equipment specifications were drawn up, with the view of getting equipment of good quality. Bids were received with the legal formalities, and equipment was selected on the basis of the specifications rather than cheapness. Bidders were persuaded to reduce their prices by the amount of freight they would save if they

were awarded sufficient contracts to make it possible for them to ship in carload quantities.

The delivery of the bonds to the purchasers was delayed until there was a need for a considerable sum of money. In the meantime, the current funds of the district were loaned to the building fund. The resulting saving was more than sufficient to equip the gymnasium with bleachers and buy mats for the tumbling teams and gym classes.

In the meantime, Principal and teachers had been working in anticipation of the change in school organization. Grades 6, 7 and 8 had been departmentalized, and assembly programs were arranged for this group in anticipation of their transfer to the junior high school. Teachers were encouraged to extend their certification to cover high school work through extension courses and through summer school attendance at various institutions. A careful search was made for teachers for the new branches such as manual arts and home economics.

When the new building was completed and the equipment installed, a final inspection was made by the architect and the building was accepted, dedicated and occupied. A few minor defects were discovered during the first six months of use and were remedied by the contractors without any expense or annoyance to the school. When all bills were paid, it was found that the total cost of building and equipment had stayed within $200 of the original estimate in the budget. Economies were effected through the steady falling of prices during the equipping period, and these savings were invested in equipment which was needed but which had not been considered in the budget for immediate purchase.

The writer will attempt to evaluate the two programs in the light of an Appraisal List for Administrative Policies and Programs Concerned with School Housing. It will be seen that both programs fall far short of being perfect.

APPRAISAL LIST

	First School	Second School
A. The Board has established policies in regard to		
1. Type of organization	Yes	Yes
2. Selection of personnel	No	Yes
3. Equal educational opportunity for all	No	Yes
4. Fostering community cooperation	No	Yes
5. Educational program	No	Yes
6. Building program	No	No
7. Standardization	No	No
8. Economy of construction	Yes	Yes
B. The Board employs surveys		
1. Population		
a. For a period of years	No	Yes
b. Present conditions	Yes	Yes
c. Prediction	No	Yes
d. Addition to territory	No	No
2. School plant	No	Yes
3. Industrial conditions	No	No
C. The Board has determined the general plan of organization	No	Yes
D. The Board has a permanent and continuous building program	No	No
E. Superintendent's statement of need rendered and adopted	No	Yes
F. Financial program		
1. Costs estimated	No	Yes
2. Financial condition known	Yes	Yes
3. Bond campaign carried out	No	Yes
G. Selection of architect on an approved basis	No	Yes
H. Plans and specifications are up to Strayer-Engelhardt Standards	No	No
J. Contracts are up to Strayer-Engelhardt Standards	No	No

A glance at the Appraisal List will convince even the casual reader that considerable improvement had been made in the thinking and practices of the Principal in the second situation as contrasted with the first. He had learned to value the experiences of others, and found that information concerning the better practices could be learned from the printed page as well as from personal contact with educational experts.

The most important lesson learned was that the experts maintained by the Department of Public Instruction of his own state were selected for the sole purpose of helping school men and school districts to get the best possible solution for their school problems. They were ever ready to make suggestions and at no time attempted to force on him any policies concerning which he was not previously convinced. They were invaluable in assisting the Board to formulate policies before the building program was really under way. From this can readily be deduced the statement that school men residing in states which do not furnish expert advice to their school districts would do well to engage the services of educational experts when called on to plan for a new school building.

Three Years Later

The depression years which have followed the erection of the second building have been a severe test of the soundness of the program. Was it planned and adopted for the "fat" years only, or could it be carried out in the "lean" years as well? Here are the facts:

There has been no curtailment of curriculum; instead there has been enrichment. Unfortunately, the teachers have suffered a 10 per cent decrease in salaries, but even now they are paid better than similar teachers in comparable districts. The length of the school year has remained unchanged, despite the fact that it extends beyond the number of days specified as a minimum by the School Code of the state. There has been no delay in paying all bills and salaries. There has been no shortage of the usual school supplies or of textbooks of recent editions. It has been possible for the district to supply the materials, enabling the CWA to make all the improvements of property that the district may need to meet for many years to come. There is sufficient money in the sinking-fund to meet payments of interest and on principal that may fall due within the current year. There are no temporary loans outstanding.

Despite the fact that tax collections have fallen from 92 per cent of the total tax levied to 82 per cent, there has been no increase in the tax rate.

Traffic Problems and Their Relationship to School Plant Development

BY BURTON W. MARSH

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MODERN traffic conditions involve many problems of interest to educators. Among these problems no other is being given as much attention as traffic accidents. A bit of background on this accident situation is deemed appropriate.

Accidents caused more than twice as many deaths to children of school age last year as any other cause of death! Traffic accounts for about one-third of all accidental deaths to children of school age—and represents the largest single accidental cause of death. For children under fifteen years of age the number of traffic deaths in 1933 was nearly 5,000, and the number injured was some 180,000. These facts constitute a sufficient reason why accidents are recognized as a social challenge by progressive educators.

But there are further reasons why educators are giving more attention to accident prevention. If education is the means by which each generation is adjusted to the environmental conditions under which it must live, as Arthur B. Moehlman states, there is a real obligation on the part of educators to help in correcting our startling traffic accident situation. A few further comparisons will provide a proper perspective on the seriousness of the traffic accident problem.

Worse Than War.—During the eighteen months preceding July, 1934, more lives were lost in traffic accidents in the United States than the losses suffered by the American Expeditionary Forces in its eighteen months of participation in the World War!

Death Rate Doubled Since 1920.—The motor-vehicle death rate more than doubled from 1920 to 1933!

Cost of Traffic Accidents Approximates Cost of Public Education.—The total annual loss from traffic accidents is approximately equal to the cost of public education in the United States. The National Conference on Street and Highway Safety estimates the traffic loss at 1½ billions per year—the Travelers Insurance Company at 2½ billions.

Traffic Accidents Again Increasing.—Following a slight decline in 1932, the traffic toll for 1933 again increased. Furthermore, there is a *serious* upward trend again this year.

In addition to accidents, several other traffic matters are important to educators, such as school parking, loading and unloading facilities, and other school transportation problems.

One of the important ways in which traffic problems relate to education is in connection with school plants and their development.

Traffic Factors Important in Locating New School Sites *

It is recognized that many major factors enter into the selection of a school site. Traffic considerations, however, are entitled to a not unimportant part in the decision.

Two diametrically opposite theories are possible regarding the relationship of traffic problems to school site selection:

1. Children must learn how to live under normal traffic conditions, and therefore it is not necessary to endeavor to locate schools so that a *minimum* of traffic problems need be encountered by children in their journeys between school and home. The fallacy of this point of view is especially obvious for children of kindergarten and primary school age. Wise parents do not allow children under six years of age even to go on any public roadway except with a reasonably experienced and cautious companion. It is unsound to assert that when these little tots start to school, they should immediately be required to encounter the full hazards of traffic. On the other hand, this theory has much more soundness when applied to youths of senior high school age.

2. The other theory—and that deemed correct for primary schools at least—is that the trip to and from school should involve the minimum number of hazards, and other traffic problems. The ideal application of this theory is in Radburn, N. J.—"the Town for the Motor Age."

In this excellent example of progressive city planning, every second or third street is not a major traffic artery. Only enough main thoroughfares have been provided for actual needs. These are well designed, adequate in w lth and largely embody the "Steady-flow" system actively advocated by the late Fritz Malcher, Frederick Bigger and other city planning leaders. There has been deliberate planning in Radburn to prevent "through traffic" from ever invading residential areas. The plan of Radburn shows very large, irregular-shaped "blocks" of residences fronting on non-vehicular areas through which are pathways exclusively for pedestrians. School children never need to cross the surface of any artery in going to school or to playgrounds. Pedestrian underpasses with ramps provide safe crossing facilities where school or play sites are on the other side of arteries. Would that all cities were so excellently planned!

* Note: This discussion relates mainly to urban territory, because the writer's experience has been mainly in cities.

But, in general, it is necessary to select school sites in areas already crystallized with the customary street system—ill-suited though it is for modern traffic conditions. What can the educational executive do under such conditions? He will have to give consideration to a number of traffic factors, including:

1. Accident hazards
2. Transportation
3. School loading and parking facilities
4. School recreation facilities in relation to traffic problems
5. Traffic noises

In preface it will be agreed that traffic conditions change as the community develops. This is particularly true of unzoned and unplanned cities. Also, traffic control measures, including physical changes, the installation of traffic control devices, and regulatory measures, may alter conditions. For these and other reasons, those selecting school sites should consult city planners and traffic engineers at the very outset. In the school site study, good judgment must be used in interpreting and evaluating the following traffic factors:

1. Accident Hazards

Analyses have shown that certain kinds of locations and conditions generally involve hazards considerably greater than average. To the maximum practicable degree, school sites should be selected which will permit children who will attend the school to avoid such hazards. Let us consider some such locations:

(a) *Hazards of Major Arteries.*—In Philadelphia some 56 per cent of all reported traffic accidents occurred on 53 streets which were largely the major arteries. In general, sites should be selected which will require the smallest practicable number of child-crossings of such thoroughfares. A traffic-flow map of the city will show which streets carry the heaviest traffic. If no such map exists, the traffic engineer and the police official in charge of traffic can designate the main arteries. The Major Street Plan will also indicate what new arteries are planned for the future.

(b) *Railroad Tracks.*—The hazards of walking along railroad tracks and of grade crossings (especially if unprotected) are well known. Introduction of these hazards should be avoided.

(c) *Streets Which Invite Speeding.*—Certain streets, often not main arteries, involve a more or less constant speeding problem. Such streets are especially hazardous to child pedestrians. The police can indicate which streets are in this class. One typical location where excessive speed is especially likely to be encountered is a street which extends into undeveloped or rural territory a short distance "farther out" from the section under consideration. Drivers who have been proceeding on the open highway at 45 miles per hour (or faster) think that they are "just crawling" when, noting a built-up section, they slow down to 30 miles per hour.

(d) *Roads Without Sidewalks*—It is distinctly undesirable for school children to have to walk along roads without sidewalks.

(e) *Locations with Inadequate "Sight Distances."*—Every motor vehicle operator *should* always so drive that if necessary he can stop his car within the "assured clear distance ahead." Experience proves that many do not observe this sane rule. Locations where drivers can see only unusually short distances ahead are very frequently accident points. Some examples are sharp hill-crests, sharp curves, "dips," bottoms of hills where tree foliage hides the roadway ahead. Such hazardous locations are to be avoided, especially near a school where many of the children will cross.

(f) *Physically Hazardous Intersections.*—We teach children to cross only at intersections. Yet, unfortunately, there are numerous intersections which are of unusual hazard physically. Among such types are the following:

(1) Multiple intersections (where more than two streets cross).—These are often irregular in shape and necessitate unusual vehicle maneuvers. Pedestrians have to cross converging or diverging streams of vehicular traffic—and usually their crossing distances are abnormally long.
(2) Irregular intersections (intersections with offsets, sharp angles, odd-shaped islands, etc.).—These induce "corner-cutting" and irregular vehicle movements with resulting hazards. Often pedestrians have unusual distances to cross and they frequently choose hazardous routes in crossing.
(3) Intersections with unusually "blind" corners.
(4) Intersections with bad grade conditions, such as at the bottom of a dip or at a hillcrest.

It is particularly to be desired that such intersections be not at or near a school where large numbers of children must cross.

How the Accident Spot Map Can Help

The question may be asked, "But how can a man analyze and evaluate these various hazards in the district under study?" From the description given, a number of the locations mentioned can be indicated on a study map. Valuable additional help can be secured by analyzing the traffic accident spot maps of your city. Comparison of spot maps of several different years or groups of years will indicate whether or not certain locations are persistently hazardous.

Hazards Which Cannot Be Avoided in Choosing Sites

Even assuming that from the traffic point of view the best possible site in the district is selected, it will be impossible to avoid certain hazards. Some of these can be reduced by measures developed in counsel with the traffic engineer and police official in charge of traffic.

The need for school children to cross certain particularly busy or hazardous streets at or near a school has been successfully avoided in some cities, notably Los Angeles. The method has been by pedestrian underpasses, which the school authorities can insist that children use. If the artery is directly in front of the school, one entrance of the underpass can even be on the school property where teachers or school safety patrol members can

supervise its use. Los Angeles has several dozen of these underpasses and they are *used* by school children where under the influence of school discipline.

TRAFFIC HAZARDS ON SCHOOL PROPERTY

Among hazards to be avoided on school property are:

(a) Exits so located and ineffectively controlled that children dash out into the street before they "get their bearings" and lose some of their school-dismissal exuberance. —In some instances, pipe fences at the curb have been considered necessary to prevent entering the street at a hazardous midblock location.

(b) Roadways through school property attractive for public use as short cuts.—Just the other day a case was reported of a school child killed by a garage employee short-cutting on such a roadway. Where roadways are desirable on or through school property for access to school parking space, or for loading and unloading of parents' and students' cars and busses, either they can be so laid out as to be unattractive to general traffic, or, if need be, they can be barricaded except when in proper use under supervision.

(c) Unwisely located and uncontrolled loading and parking facilities.

2. TRANSPORTATION

Another traffic factor important in the selection of certain school sites is that of transportation facilities. While most of us who grew up in all but the largest cities walked even to high school—and it was good for our health—youngsters in increasing numbers are riding to school. Especially in the larger cities and where high school sites are selected out on the rim of the city where adequate space is available at reasonable cost, distances may really warrant riding—and reasonable proximity to adequate transportation service is an important consideration.

3. SCHOOL LOADING AND PARKING FACILITIES

Motor vehicles have created new loading and parking problems at schools. What is to be done in the selection and development of sites to meet the traffic problem created by parents bringing children to school and calling for them, by school bus operation, by automobiles used by teachers and high school students? Roadways in front of some schools are seriously congested by parents discharging and waiting for children and by the cars of teachers and high school students. The condition is especially serious in bad weather when parents desire to let children out and pick them up right in front of the entrance. Often automobiles in such cases are stopped and unloaded or loaded right in the middle of the street. This is hazardous

A COMMUNITY PLANNED FOR THE MOTOR AGE
Diagram of Section 1 and vicinity, Radburn, N. J.

as well as congesting. It is likewise hazardous for children to have to cross arteries in getting from a school bus to the building, or vice versa. Parking in front of school properties is generally frowned upon, and nearby residents also complain about teachers' and students' cars being continually parked in front of their homes.

Whether we like it or not, the answer to these problems is off-street loading and parking facilities at schools. Simple loading and unloading can be provided for by a semi-elliptical drive on the school property. This should preferably lead to an entrance not used by children who walk. It should be long enough to permit an estimated maximum number of cars to stand while waiting to load. It should preferably be a one-way drive at least 20 feet wide, so that waiting vehicles and the not always accurate maneuvers of drivers will not interfere with the movement of loaded cars.

MOTOR SIDE, AUDUBON PLACE, RADBURN

At senior high schools and other schools where off-street parking space is needed, the design of entrance and exit roadways and of parking space involves the problems of any outdoor parking lot. One-way movement for entering and leaving simplifies the operation of parking lots.

If the school has an auditorium which is frequently used for night meetings, consideration should be given to providing adequate off-street parking facilities for the cars of a capacity attendance, and night lighting should be provided.

The choice of location for parking facilities should be carefully made, with due regard to hazards. The plan of surrounding the athletic field with parking spaces may at first glance seem an excellent solution. This plan is not recommended, for two reasons:

1. Youngsters running from the athletic field after a ball or on their way to the dressing room cannot see moving cars because of the parked cars between which they are running.

2. Spectators who frequently "follow the play" along the side-lines or go onto the field under certain conditions should not be subjected to the hazards of leaving between cars parked and backing out.

The relationship of the parking space to play space should likewise be carefully planned to avoid hazards.

A traffic operating plan should be carefully developed in advance, and necessary limit fences (or logs), signs and markings must be installed so that drivers can readily understand and adhere to the plan. A wise precaution is to require a full stop before a vehicle crosses the sidewalk in leaving the school property.

GARDEN WALK LEADING TO UNDERPASS, RADBURN

4. SCHOOL RECREATION FACILITIES IN RELATION TO TRAFFIC PROBLEMS

Under this head only two traffic relationships will be mentioned:

(a) It is undesirable for children to have to cross a public street in going from the school building to the play area. If space limitations, property values, or other factors result in the selection of space for play on the opposite side of a street or highway from the school building, an underpass may be warranted.

(b) Play space should be located sufficiently distant from streets or should be so enclosed that playing children will not have occasion or opportunity to run out into the street after a ball or while being chased.

5. TRAFFIC NOISES

The numerous injurious effects of noise upon human beings are fortunately securing increasing attention. School buildings should be set well back from noisy streets. Aside from their esthetic value, trees help considerably as noise screens.

Should Schools Teach Safety and Other Traffic Matters?

Up to this point we have considered the seriousness of traffic problems and some of their relationships to school site selection. It is now proposed to lead up to a discussion of facilities in schools for effectively teaching children how to avoid accidents and how to meet other demands of modern traffic. There immediately arises the question of what part, if any, should be played by public school education in preparing children to adjust themselves wisely to the vastly changed conditions brought about largely by 24,000,000 motor vehicles on our streets and highways.

Few thoughtful persons will deny that existing traffic conditions warrant more effective traffic education. Traffic education should include training as to:

(a) Causes of accidents
(b) Safe pedestrian practices
(c) Physical laws which govern the operation of vehicles
(d) Traffic laws and regulations—why they are necessary and what they mean
(e) Principles of safe and proper vehicle operation
(f) Duties and responsibilities of drivers and pedestrians
(g) Proper personal attitude

HOW IS TRAFFIC TRAINING TO BE ACQUIRED?

Where and how is such training to be acquired? Some believe that it should be given in the home. But experience has clearly demonstrated that satisfactory traffic training is not being given in the home. Moreover, it *cannot* be given by many parents, because accident and violation records show that, even if they are drivers, they do not have a proper understanding of the subject themselves!

Can the acquiring of traffic knowledge be left to chance? To date, at least certain phases of it have been largely left to chance. Do present conditions commend a continuance of this policy?

Should special agencies be set up for this one purpose? Well, states having compulsory examinations do carry on a helpful educational work in connection with their licensing procedure. But it is far from adequate—as is demonstrated by the records of such states (much better though they generally are than records of other states). Many states do not yet even require a driver's license—anyone may drive a car!

Drivers' schools and schools for violators have been inaugurated in a number of cities. These attempt in a few brief sessions to teach fundamentals which need to be much more thoroughly instilled in the minds of drivers and future drivers.

Various civic agencies and a few governmental agencies are carrying on traffic educational work to the extent that limited finances permit. Much of this work is valuable, but it does not cover the need.

Perhaps the most significant feature of these activities is the recognition of the need for traffic education which they exemplify.

Leading students of the problem believe that traffic training must be thorough and that it can best be given in youth. *It is believed that the public school is the logical place for such education.* The recent Fourth National Conference on Street and Highway Safety strongly recommended traffic education in our schools.

EDUCATORS IN INCREASING NUMBERS ARE GIVING TRAFFIC INSTRUCTION

The fact is that traffic safety education is *now* being effectively carried on in a large proportion of grade schools—and I am happy that the American Automobile Association is one of the leading civic organizations cooperating with teachers in this safety educational work. By monthly lesson sheets, posters, school safety patrols, playlets, films, safety projects, and talks, a splendid job is being done in thousands of grade schools.

With what results? Highly encouraging ones! In fact, the school child accident record is one of the few bright spots in the dark picture today. In the past ten years, grade school children have reduced their traffic death rate, while the rates for all older age groups have increased over 100 per cent (one age group by nearly 200 per cent). Surely this is proof of the value of safety education in schools.

WHAT OF THE HIGH SCHOOL AGE RECORD?

Most school work to date in traffic safety has been directed to the child *pedestrian.* What about the young driver? While conclusive factual evidence is not available, the indications are that young drivers are involved in far more than their proportionate share of fatal accidents. Also, between 1922 and 1931 the automobile accident death rate for youngsters aged 15 to 19 increased 165 per cent, according to an analysis by the Travelers Insurance Company.

Both because of the records they are now making and because they will be the adult drivers of tomorrow's speedier cars, there is a real challenge to engage in traffic educational work in high schools.

Do high school children want such training? In a recent check-up in one large high school, over 90 per cent of the youngsters wanted to secure such training. True, that is but one isolated instance, but there is further support from the increasing (though still small) number of high schools which are providing traffic education.

In this connection I quote from a report, "Guides to Traffic Safety," of the Fourth National Conference on Street and Highway Safety:

"It is fair to say that the high schools as a whole are nearly ten years behind the grades in their recognition of safety. Yet in some ways the need is even greater. The little child needs to be taught how to cross the street. But the high school student needs to be taught how to drive, and if he is not taught, he may kill or injure others as well as himself. He needs to be taught not only the mechanics of driving but the principle of fair play—the need for and the nature of traffic laws and regulations.

"During the past two or three years a small but rapidly growing number of high schools have recognized this responsibility and taken important steps in working out satisfactory methods. These must differ from the methods in the grade schools, just as the high school and the grades differ in other respects. The methods which have proved successful include assembly or home room programs, the display of posters, essay and poster contests, inclusion of safety in the courses in automobile mechanics, student safety councils, student motor traffic clubs, and courses in driving, for all or a large part of the student body."

But, said a prominent educator, what percentage of school children will drive cars? Well, there are about 32 million drivers in this country today. Besides, nearly two-thirds of those killed in traffic accidents in cities are pedestrians! As drivers or pedestrians, or both, *all* school children are going to face the problem of living in traffic. If knowledge is worth while, they all need it!

"The curriculum is already overcrowded." This is a very real problem, but if educators will agree to the need and will accept traffic training as a proper function of public school education, some way will be found to provide it.

What facilities are needed in the school building to do this new job properly?

Facilities Needed in Schools to Teach Safety and Other Traffic Subjects

In grade schools, few special facilities are needed. Space and equipment for motion pictures have proved their value in teaching safety. Space is also desirable for exhibits of safety posters, scrap books, compositions, dummy signals, playlets, etc., developed by the children. Safety can be effectively introduced into many of the regular subjects of instruction.

How is traffic training to be provided in high schools? This is a very practical question and one not easily answered. Numerous educators and several of the leading national civic agencies interested in traffic safety (including the American Automobile Association) are now actively studying this problem.

Some favor extra-curricular clubs—but this plan has the weakness of not providing the necessary training to the entire student body. A number of us believe that the only sound and adequate answer is to provide at least the general essentials of traffic training within the curriculum for all high school students. In high schools, many fundamentals of traffic can be taught in regular courses in mathematics, physics, English, civics, drawing, and in regular assembly programs.

However, to treat certain traffic matters effectively, additional facilities are desirable. For example, in a laboratory or shop, there should be an automobile engine mounted on a regular chassis. Equipment should be available to demonstrate the tremendous power developed at high speeds—and experiments should bring an understanding of what that power involves in terms of speed and impact force. Other experiments should demonstrate the loss of braking efficiency on various conditions of pavement, and the forces acting on a car traveling on curves of certain radii at various speeds.

Through the extensive use of motion picture equipment, many traffic fundamentals should be taught. Right and wrong practices can be effectively contrasted by illustration. The principal causes of accidents can be demonstrated. Recently, some excellent motion pictures of actual accidents have been made by the state of New Jersey. Properly used, these should leave strong impressions on the students' minds as to what the skillful driver should avoid.

But shall we not see our high schools going much further? Already, high schools in Rhode Island are examining and certifying youths on important prerequisites to receiving a driver's license. And these certifications are being accepted by the state.

One of the major difficulties with drivers' examinations conducted by states is the short time available for each applicant. Is it not reasonable to look for clinics conducted in our high schools in which students who are potential drivers will be more thoroughly examined? For example, other elements of sight are important in addition to acuity and color-blindness. Some persons cannot see far enough to the sides when looking straight ahead, to drive without special compensatory precautions. Reaction time is very important—and a person with abnormal reaction time should certainly know this fact and constantly adjust for it in his driving. The future will produce equipment and methods for developing judgment of distances in terms of speeds—this being a *major factor* in safe driving.

These are but a few illustrations of what better tests will include. It should be pointed out that the fundamental purpose will not be to exclude persons from driving, but to give them more accurate knowledge of themselves as drivers and of what precautions they must take in driving.

The active curiosity of high school students and their desire to experiment and to find out for themselves will lead to numerous traffic projects. Suitable rooms will be needed for group work and conferences on such projects, for the mounting of maps, charts, drawings, and for models of various sorts.

Where space is not at too great a premium, the high school may even have its own little driving

instruction course where youths will be tested as to their driving abilities, and errors or weaknesses corrected.

The high school is destined, I believe, to play a major part in a future large reduction in traffic accidents and improvement of traffic conditions.

Summary

Modern traffic conditions involve many problems of interest to educators.

Traffic accidents involving an annual loss approximating the cost of public education constitute one of today's most serious social problems.

Because of their importance, a number of traffic factors should be given thorough consideration in the selection of school sites. These factors include accident hazards, transportation, school loading and parking, relation of playgrounds to traffic hazards, and traffic noises.

Many inherently hazardous locations and conditions can be identified and evaluated with reasonable accuracy.

Recognized hazards which cannot be avoided in choice of location can often be removed or reduced by advance planning, including such remedies as pedestrian underpasses and traffic control devices.

The school property plan should be designed to avoid such hazards as roadways which invite the general public to use them for short cuts, and school exits from which children dash directly into the street.

Safety and other traffic subjects should be taught in our schools. Safety is already being effectively taught in thousands of grade schools, with the result that traffic death rates of children of grade-school age have decreased while death rates of all older persons have markedly increased.

The greatest challenge for further advance is for traffic education in our high schools. Present hit-or-miss methods of preparation for driving have failed. This is particularly true of young drivers whose record is much worse than average.

If educators will whole-heartedly accept the challenge to teach traffic in high schools, much can be done to reduce accidents and otherwise to improve traffic conditions. New facilities and methods will be needed.

Universal high school traffic education of an effective character will open a new traffic improvement era.

—The foregoing paper was read by Mr. Marsh at the Conference on Educational Planning held under the auspices of the Division of Field Studies, Teachers College, Columbia University, July 20, 1934.

The Major Street Plan as It Affects the Location of School Buildings

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THE location of any building is dependent to some extent upon the street plan of the community in which it is situated. A street is necessary to provide access both for individuals and for public services and utilities. As a school building serves a neighborhood within the municipality, it should have a definite relation not only to the local street plan but also to the major street plan which connects it with other parts of the municipality.

In order to discuss this relationship, it will be necessary to review in some detail the scope of a major street plan, commonly called a thoroughfare plan. It can be shown that the pattern followed by such a plan may have a very close similarity to a proper layout of school districts.

The desirability of community and neighborhood planning as a part of a city plan has recently been generally recognized. Some of the principles to be followed in such planning will be discussed, particularly as they affect the location of the school site. It will be shown that the neighborhood unit idea is a very flexible one and can be applied equally well to areas of different population density.

Finally, some examples will be given, from both theoretical studies and actual accomplishments, where school sites have been laid out as a major part of a community plan and properly related to the major street plan of the municipality in which they are located.

Factors Involved in Locating Schools

First it is advisable to consider the main factors which are involved in selecting a school site. It should be recognized that many school boards have been forced to go ahead and lay out a series of school sites without having the advantage of a city plan or even of a major street plan for the municipality which they are to serve. Such boards have had to form their own conclusions as to how the city will grow, and have had to do so without the facts that would have been available if a city planning board had been functioning in an efficient manner.

From the start, suitable access by highway or any other transportation lines, convenience to other public services, and a central location in regard to the population to be served, were naturally considered. Under present-day conditions, it is now necessary to take other factors into consideration. Safety from motor-vehicle accidents on heavily traveled roadways and protection from

the noises of the modern city should be considered. The adoption of zoning plans makes possible a better analysis of the relation of the site to existing and probable future land uses and population distribution. The importance of placing the school in the neighborhood center, which will include other cultural activities and recreation facilities, is now recognized.

In sparsely developed areas, the country schoolhouse is often found in open country midway between those settlements which it is designed to serve. In the small town with a "Main Street" type of development, the school site has often adjoined the main thoroughfare. While convenient access from such a thoroughfare may be desirable, a site upon a side or parallel street would have many advantages. It is, of course, the urban school site that should have the most definite relation to the major street plan.

What Is a Major Street Plan?

The vehicular traffic problem is one that is present in all our American communities, both large and small. Accidents, delays, lack of parking space, noise and objectionable fumes are all features of this problem. A heavily traveled, through traffic street is no longer considered desirable for residential purposes. Local and through traffic should be separated as much as possible.

A major street plan should provide an adequate solution to these problems. It is generally the first study to be undertaken in preparing a comprehensive city plan. In the past many such street plans have not been carried out either because they have been too idealistic or because the necessary legal machinery to make them effective was missing. It is important, therefore, that the street plan be carefully tied-in with other parts of the city plan and that the whole be based on an orderly procedure of execution.

Most street systems have grown without a preconceived plan. They have started with a principal thoroughfare, from which connections have radiated to other population centers. Secondary streets parallel to the first "Main Street" have been provided as population and traffic increased. In many cases the local street plan has grown as part of a gridiron system of streets of uniform width laid down over large areas without providing any wide major streets to serve as principal traffic arteries. An adequate street plan should provide both primary and secondary thoroughfares for general traffic. These should also be supplemented by such special routes as express highways and parkways.

An ideal diagrammatic street scheme would consist of a loop highway around the main business district. Within this should be a gridiron system of streets, running parallel to the two main axes of the community. Outside the loop and leading to adjoining communities should be a series of radial highways, a few of which should continue across the area within the loop. They should be connected by a series of outer circumferential highways.

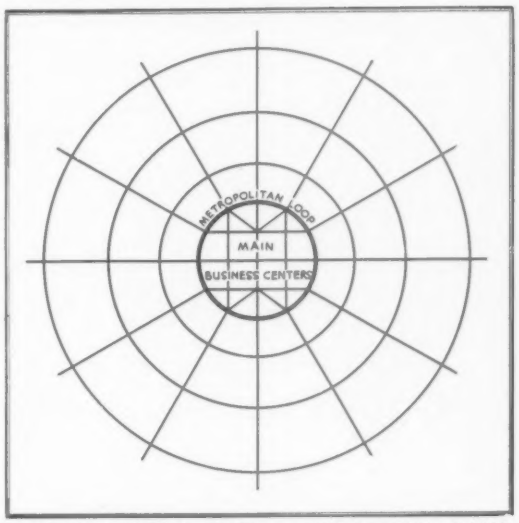


DIAGRAM SHOWING HOW A THEORETICAL MAJOR STREET PLAN DIVIDES A CITY INTO "CELLS," INCREASING IN SIZE AS THE DISTANCE FROM THE CENTER INCREASES

Cells of the City

Such a scheme is applicable to both municipal and metropolitan planning and has been found particularly useful in developing the regional highway and railroad proposals for the Regional Plan of New York and Its Environs. It will divide the area of a municipality up into a series of cells formed by the interstices between major highways. These cells will provide "islands" free from through traffic. Their size will increase as the plan extends outward from the center of the municipality, as the distance between both the radial routes and other parts of the network of major streets increases. The resident population within each cell may be fairly constant, since the population density will decrease toward the outer edges of the community.

It will be found that natural-sized neighborhoods will require areas equivalent to one or more of these cells in the major street plan of the city. In the more densely populated sections only half a cell may form a neighborhood. Each such area should have its own elementary school, which will provide one of the main focal points around which it should be laid out. We thus have a definite relationship between the school district and the major street plan.

The exact location of the school site depends not only upon the boundaries of the neighborhood unit but also upon the design for the detail development of that particular portion of the city.

Neighborhood Unit Planning

This leads us to a discussion of the science and practice of neighborhood unit planning. This is a fairly recent term. The first complete presen-

tation of the subject appeared in the Regional Survey of New York and Its Environs in 1929 in a section prepared by Clarence A. Perry, Associate Director of the Recreation Department of the Russell Sage Foundation.* In this report it was suggested that the neighborhood unit should be an area which is tributary to a single elementary school. As the size of a school unit is relatively stable, this means that the area of the community would vary indirectly with the density of its population.

Although a standard of a minimum of 1,000 pupils for an elementary school has been suggested by some authorities, it was found that in smaller cities many schools have been constructed to serve between 400 and 500 pupils. It was therefore concluded that a minimum of 800 pupils per school could be assumed as a basis for neighborhood planning. This would require a minimum total population of 4,800 in the neighborhood unit. The maximum population to be accommodated in a single unit would be about 9,000 persons.

This line of reasoning indicated that in a detached house district, where a 40 x 100-foot lot per family is typical, the neighborhood unit should be about 160 acres. In central urban districts, where large multiple-family buildings are the rule, such units might be only 20 to 30 acres in size, or might represent only five to ten city blocks.

In other words, this type of planning can be made flexible enough to fit any type of neighborhood. A unit can be designed for single-family dwellings, apartments, or a combination of the two; for low-cost, medium-cost, or a rich man's settlement; for industrial workers, or "white collar" workers. It can be made to function best where undeveloped land makes possible an entirely new street design, but it can be fitted into an established street system by minor changes in the widths of streets and the possible closing of certain sections of existing streets.

In any event, the unit should be bounded by wide streets so that there will be no necessity for any vehicles other than local traffic to enter within its boundaries. The interior streets should, if possible, be indirect in alignment so as to discourage their use by through traffic. Where major streets are so close together that a suitable area can be obtained only by combining two of the cells bounded by such streets, a pedestrian connection should be provided over or under the street crossing the neighborhood unit.

The school should be located near the center of the area and can well be grouped with other community buildings, such as churches, a library, a neighborhood park, and athletic and other recreation facilities. Convenient pedestrian access to residential lots may in some cases be provided by paths through narrow strips of park land laid out between building lots. In some cases, grade separations between pedestrian ways and local streets within the community may be justified to eliminate the danger of accidents to children on their way to or from the school.

Size of Unit Checked by Highway Planning Theory

Most of the area devoted to residential property is built up with single-family homes. Here the neighborhood unit theory calls for a cell of 160 acres between major streets. This would make an area 2,640 feet, or ½-mile, square. It is interesting to note how closely this, as well as a suitable size for units with multi-family dwellings, checks with an entirely independent approach by Ernest P. Goodrich, consulting engineer, to the proper design of a major street system. He found that:

"The main thoroughfares in single-family residence districts should be spaced not to exceed 3,000 feet apart; 2,000 feet in two-family house districts and 1,250 feet in multi-family house districts." *

In commenting on this check with highway planning theory, Mr. Perry, in his report already referred to, said: †

"From the standpoint, therefore, of the channels needed for through traffic, the neighborhood unit cell with its half-mile, or 2,640-foot, typical dimension fits nicely into a desirable street pattern. In the same paper, Mr. Goodrich points out that 'in general, the density of the population varies inversely as the distance from the center of a community.' Likewise, series of neighborhood units, ranging from single-family densities in the outskirts to multi-family densities in the central parts of the city, could decrease proportionally in size and still hold to the school-population standard.

"Another answer to the same question, and referring especially to the proper interval for circumferential highways, is contained in the plans of the Transit Commission of Detroit, Mich., for an elevated motor boulevard which provides ramps and openings for cross streets at every half-mile. If both sides of this express highway were lined with square neighborhood units, its cross streets would coincide exactly with the unit boundaries. We may conclude, then, that the standard which has been set up as the desirable size of a local community district can be applied without impairment of general circulation facilities."

But neighborhood unit planning is not just theory, as it has advanced beyond that stage.

One of the best examples is the community of Radburn in Bergen County developed by the City Housing Corporation.‡ Here a self-contained residential community was laid out in super-blocks about 1,500 feet by 1,000 feet. Practically all the houses front on short dead-end streets, and the interior of each block is set aside as a public park bordered by pedestrian ways. The elementary school district will be made up of two or

* "The Neighborhood Unit—A Scheme of Arrangement for the Family Life Community," Regional Survey, Vol. VII, Monograph One.

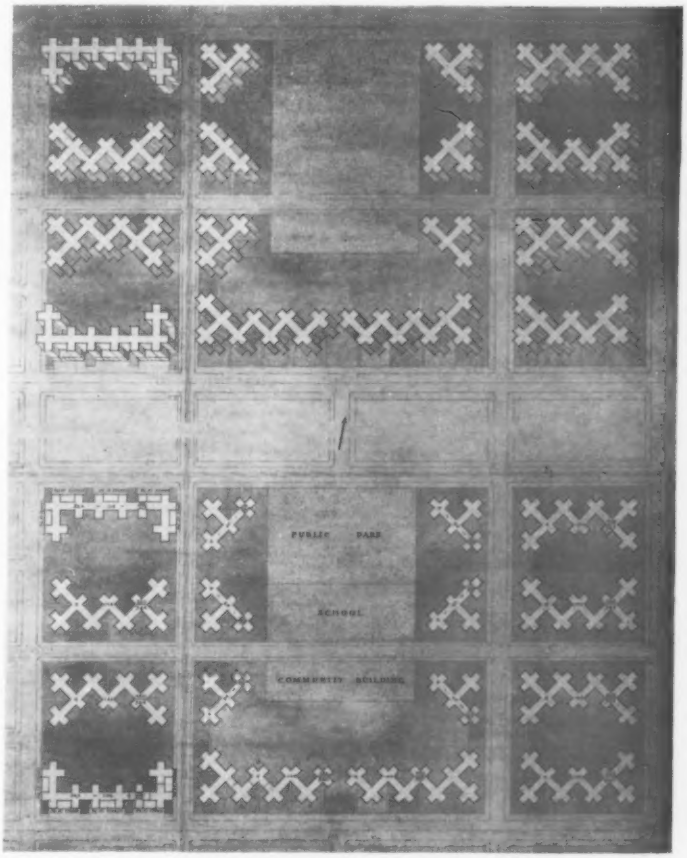
* Proceedings of Fourteenth National Conference on City Planning, 1922, page 102.

† Regional Survey, Volume VII, page 52.

‡ See illustrations on pp. 30 and 31, this volume:

more of these super-blocks with the school located in a central site. Pedestrian ways leading to the school will be provided with grade separations at intersecting streets, so that it will not be necessary for the child to cross any roadway passing between its home and the school. Several blocks of the Radburn development have been completed and it is operating successfully, supplying a practical demonstration of the relationship of school sites to a major street plan.

As a theoretical application of neighborhood unit planning to single-family development, a study was made by the Regional Plan of a 160-acre tract located in the borough of Queens, New York City. This provided, as part of a community center, sites for a school, a public library and two churches. Bounding streets were shown at widths of 120 to 160 feet, and interior streets, 40 to 50 feet in width. It was found that such a plan, when compared with the gridiron system of streets laid out on the city map for this same section, represented considerable savings in cost of development, fitted the topography much better and would provide an attractive neighborhood with its own community buildings and parks in place of a standard development without any distinctive features.



PLAN BY TOOKER & MARSH FOR A LOW-COST HOUSING PROJECT

Submitted in an architectural competition held by the New York City Housing Authority which required the provision for a school site properly related to the major street plan

The first demonstration of a neighborhood unit of this general type is Forest Hills on Long Island, started in 1911 by the Sage Foundation Homes Company, a subsidiary of the Russell Sage Foundation. The site is bounded on two sides by major highways and on a third side by the Long Island Railroad, which is paralleled, a short distance away, by another major highway. As finally developed, it comprises 164 acres, almost exactly the area of our theoretical site. An irregular street system was substituted for the gridiron system previously mapped by the city, and thus privacy from through traffic was obtained. The school site is centrally located, convenient yet secluded.

As an example of the application of the neighborhood unit to a very intensive type of development, the Regional Plan also presented a study for a five-block area in the borough of Manhattan. This was designed as a high-cost development involving tall apartment buildings. It also was built around its own elementary school, and the neighborhood character was maintained by closing two of the cross streets and carrying the two other cross streets beneath a central garden.

Still a third study was made by the Regional Plan for a typical blighted area midway between the intensively developed central districts and the outlying population centers within the city limits. For this purpose a tract of about 40 acres in the Winfield section of the borough of Queens was selected and a series of alternative studies were presented in a printed report.* All these studies were based on the widening of the bounding streets so as to fit them in with a major street plan for the city of New York. An elementary school was included as one of the central features of each plan, and adjacent to it parks, athletic fields and children's playfields were provided. It was found that such developments should be practicable for either low-cost or high-cost housing and that from 8 to 9 acres of public play spaces could be provided as a part of the development.

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* "The Rebuilding of Blighted Areas," by Clarence Arthur Perry, Regional Plan Association, 1933.

—This paper was presented at the Conference on Educational Plant Planning, held under the direction of the Division of Field Studies, Teachers College, at Columbia University, July 20, 1934.

Section II

DESIGN AND CONSTRUCTION OF BUILDINGS

Structural Changes Which Modern Educational Ideas May Involve

BY RAY L. HAMON

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A SCHOOL building is a tool to be used in shaping the lives of boys and girls. Changing civilization and changing ideas of education sometimes make it necessary to rearrange school buildings in order that they may function more effectively in a dynamic society. The more permanent the building, the more changes will be necessary during its period of service in education.

The plan of any room should be determined by the number and size of the occupants, and the equipment and materials necessary for the desired activities of these occupants. The plan of any building is an efficient grouping of the required rooms with the necessary connections and service systems. Unfortunately for the school-building planner, we know neither the size nor the desired activities of the groups to be housed. Both of these factors are constantly changing with our changing ideas of what we mean by modern education.

As new educational ideas appear, it is difficult to know whether they are mere passing whims of individuals and small groups, or the forerunners of fundamental educational changes. There are, however, many modern educational ideas which have passed the stage of ultra-progressive hobbies and have become established principles in even the moderately progressive public school system.

Some of these modern educational ideas which seem well established and which have considerable bearing on a school building are :(1) socialization of the class period; (2) greater use of the basic muscles in handling large materials; (3) greater use of visual aids; (4) use of objective tests; (5) the extension of the program to include music, art, elementary science, health, physical education, and the pre-vocational activities; (6) emphasis on extra-curricular activities, continuation schooling, and adult education; and (7) changes in the organization to include the kindergarten, the junior high school, and the junior college.

What types of structural changes are involved in altering a building to conform to these modern educational ideas?

Altering Room Sizes

At present, the typical elementary classroom is about 22 by 30 feet. The typical high school classroom is about 24 to 28 feet long. There is no assurance whatever that these are the room lengths which will be suitable for the class sizes of the next generation. Objective tests and economic conditions seem to indicate that larger classes may be the vogue. At the same time, those advocating a greater amount of individual attention hold for a small class. In all probability the future school will have much larger groups for the visual and audible phases of the program, and smaller groups for individual activity and expression. This argues for an economical flexibility in room size.

The size of the room can be altered in only three ways—length, width, and height. Changing the height seems quite out of the question. When a building is erected, the ceiling height is almost as permanent as the building itself. Unless we contemplate some type of flexible construction not yet in use, the only practical way of altering ceiling height would be to make two classroom stories by inserting a floor slab across a large general room.

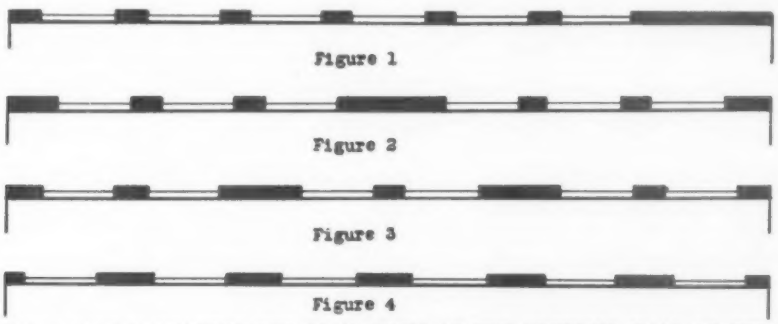
The width of a room is almost as fixed as the height. It would be possible to make top-floor corridor walls non-bearing by spanning the entire building with a roof truss, or the wall on one side of a corridor could be non-bearing by including the corridor and one room width in a single span. It is very doubtful, however, if this expense could be justified unless there was definite knowledge that the side wall would need to be moved. If a room is too wide, this condition may be corrected by cutting off a cloakroom or a storeroom for supplies on the corridor side. Or in planning a new building, such space may be provided between the classroom and corridor and eventually added to the room, provided

the structural columns are on the corridor side of the cloakroom or supply room.

The width of a classroom is definitely connected to its height by present lighting standards. It is possible, however, that this may be changed by a different type of window glass and artificial illumination for the dark side of the room.

The most practical way of altering the size of a room is by moving the end wall. For this reason, end-partition walls should be non-bearing and, so far as possible, free from pipes and ducts. This is hardly possible where classrooms join stair wells or toilets. In a large school building, however, there are many end walls which can be constructed of hollow tile or some other type of curtain-wall construction so that they may be moved with little expense.

Some attempts have been made to divide rooms by temporary partitions which can be moved in a few minutes with no structural alterations. This may be accomplished with folding doors or collapsible partitions. It would even be possible to arrange an end partition on a track so that it could be moved back and forth at will to form classrooms of any length. Such provisions may be justified when the present educational program requires varying classroom sizes, but it would not be advisable to incur the expense or inconvenience of such temporary partitions for the sake of some possible future educational change.



FOUR FIGURES SHOWING THE PLAN VIEWS OF THE EXTERIOR WALL OF THE MODEL CLASSROOM WITH THE FOUR DIFFERENT TYPES OF WINDOW ARRANGEMENTS

Window Arrangement

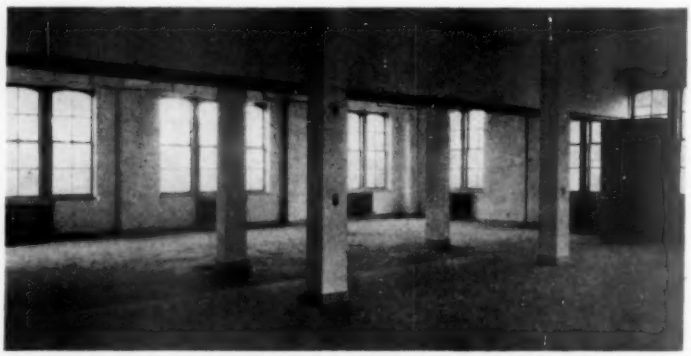
Although exterior walls must be considered as permanent, it is possible to completely change the fenestration by using a skeleton framework and curtain-wall filler. Thus, the entire panel between two columns and two beams may be removed and the windows changed in any way desired. It hardly seems that this expense should be necessary, however, as it is difficult to conceive of any educational change which would greatly alter the demand for natural illumination. The desirability of natural light in a schoolroom is too obvious to debate. There is no question as to the desirability of having window tops as high as the ceiling will permit, in order to better light the darker side of the room. This will be true even with a type of glass which will throw the light across the room more effectively and with automatic control of supplementary artificial light on the dark side of the room. In all rooms where the children read, write, and perform any kind of concentrated eye work, it will always be essential to maintain unilateral lighting and keep the windowsills slightly above the eye height of the occupants seated next to the windows. Our present standards regarding horizontal spacing of windows may have to be modified, however, if we are to erect school buildings which will be sufficiently flexible to care for changing ideas of education.

If windows were confined to one side of a classroom and kept 3½ feet above the floor, there would be 255 square feet of wall where windows might be placed in a room 30 feet long with a 12-foot ceiling. If we assume a room 24 feet wide and a glass area of 25 per cent of the floor area, we have a glass-area requirement of 180 square feet. If metal windows were used, there would have to be about 9 per cent added to the glass area to determine the gross opening of about 196 square feet. If the windows were extended to the ceiling, there would be about 59 square feet of wall for columns and dead-wall sections. If this 59 square feet is divided by 8½, we have about 7 horizontal feet of exterior wall to be used for columns between windows and dead-wall sections at the front and rear of the classroom.

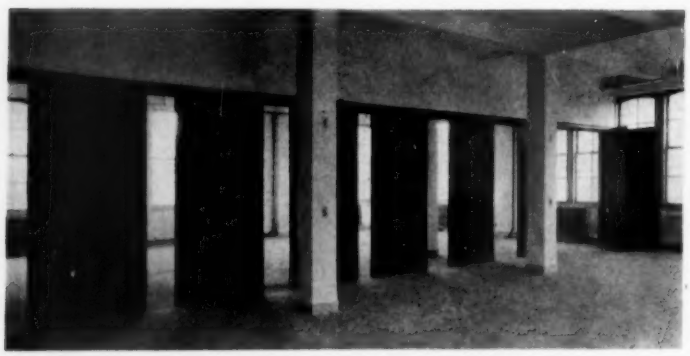
We might assume another situation similar to the above except with a room 22 feet wide, wood sash extending to within 6 inches of the ceiling, and 20 per cent glass area. With this situation, there is a wall area of 240 square feet where windows may be placed. The glass-area requirement would be 132 square feet. With double-hung wood sash, it would be necessary to add about 30 per cent to determine the gross opening, which would be about 172 square feet. This would leave 68 square feet to be divided by 8, which gives 8½ horizontal feet for columns between windows and dead-wall sections at front and rear of room.

These calculations indicate that, in the typical classroom, there will be about 7 or 8 horizontal feet to devote to columns and wall sections if our present standard of glass-floor ratio is to be maintained. Some of this space is needed for structural columns. There is no reason for allowing any such space for purely artistic effect, since the architectural design may be made to fit the structural design and functional requirements.

The end partitions will abut columns; and, for the sake of economical construction, there may be need for one or two intervening structural columns. If the end partition walls are to be moved in order to alter room lengths, these intervening columns will also be needed for resetting the partition walls. A 4-inch tile wall may be set on a 1-foot column, but the effect is much better if the column is 2 feet wide. One such intervening column in a 30-foot classroom would make possible any room length in multiples of 15 feet. Two such intervening columns would make possible any combination of 10-foot units. This is a very convenient unit of construction, for one such unit would make an office, stairway, or toilet. Two of these



THE FULL SPACE AVAILABLE—PARTITIONS STACKED AT END OF ROOM



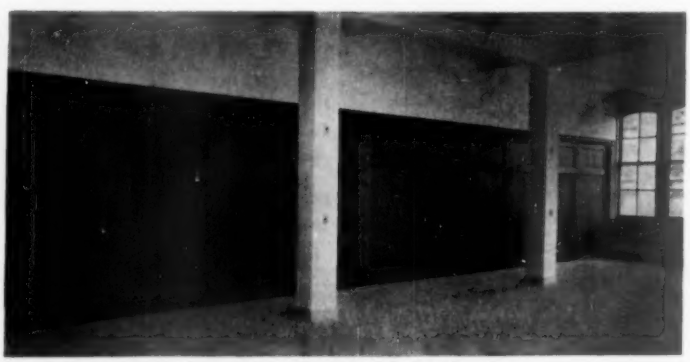
SOME OF THE PARTITIONS IN PLACE

10-foot units would make a small classroom, three a standard classroom, and four an over-sized classroom or laboratory.

Such an arrangement as suggested above is in conflict with practically all the published standards on this point. The standard which requires a dead-wall space of 5 to 7 feet between the front wall and first window assumes a classroom situation where the pupils face the front of the classroom and look at the front blackboard much of the time. This situation is not as common as it was, and is becoming less common with modern educational ideas. When the front board is in use, the shade may be drawn on the first window to prevent glare on the blackboard.

A standard which objects to a column of more than one foot between windows overlooks the fact that the child in the first row of seats next to the window, even when he is in a shadow of a 3-foot column, has as good light as any child in the second row, and probably several times more light than the children in the row farthest from the windows.

It seems that structural economy and the necessary flexibility to meet changing conditions will require us to use intervening structural columns in permanent school buildings. If we maintain our standards of glass area and use intervening columns, there will be no space left for the dead-wall which has been advocated between the front wall and first window. Obviously, if such a space is necessary, the altered room would be improperly lighted after moving a partition to a 1-foot column. It seems that we must plan for an economical means of altering room length, since this is about the only way to secure



Photographs by courtesy of American Car and Foundry Co.

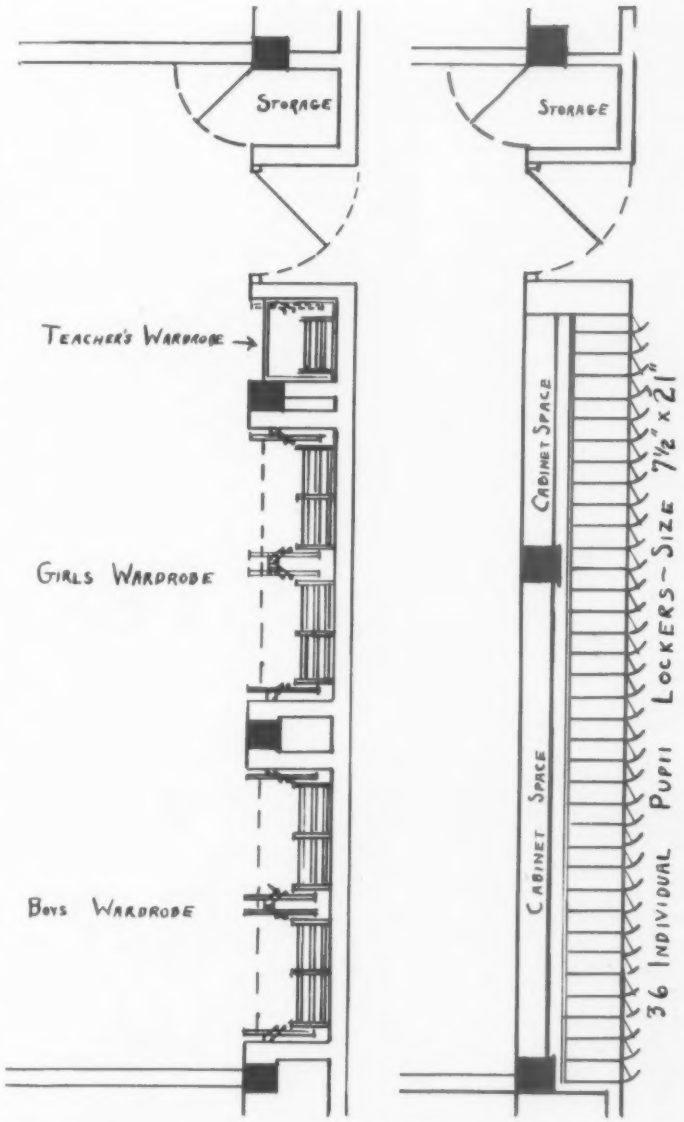
THE MOVABLE PARTITIONS HAVE MADE TWO ROOMS OUT OF ONE

much flexibility in permanent school buildings.

Built-in and Storage Facilities

One of the most obvious changes in the schoolroom brought about by modern educational ideas is the quantity of materials being handled by the pupils. These materials include a great many books, mimeographed practice exercises, self-testing materials, posters, paints, modeling clay, construction blocks, carpenter tools, and large crates and boxes for making play houses and miniature villages. The progressive schoolroom in a traditional building is usually characterized by a cluttered appearance due to the lack of proper storage facilities for materials used in both individual and group activities.

The modern schoolroom needs an abundance of book and magazine shelving, correspondence files for mimeographed materials and clippings, large flat drawers for poster paper, tool racks, and closet space for the storage of large materials. This space may be provided by built-in equipment and closets at the ends of the classroom or along the corridor side of the room. Inasmuch as it is desirable to keep the ends of the room of simple construction for the sake of flexibility in altering room lengths, it may be wise to provide built-in equipment and closet space between the classroom and corridor. This can usually be done by the double-wall type of construction with a 3-foot space between classroom and corridor. This space is probably more economical than equivalent space at the end of the room. It also provides room for structural columns, vent ducts, and pipes where they will not interfere with the altering of room lengths.



CORRIDOR PARTITION ARRANGEMENT WITH WARDROBES OR LOCKERS
The locations of the columns as shown in the drawings will give greater economy of construction, but greater flexibility in room size can be secured by placing the columns flush with the corridor side of the partition

Space for pupils' wraps may be secured by classroom wardrobes or adjacent cloakrooms if the school is operated on the basis of the exclusive use of a room by one group of pupils. Secondary schools and platoon schools will require wrap-storage space accessible from the corridor—provided by corridor lockers, corridor wardrobes, locker rooms, or locker alcoves.

It is very likely that some schools will change from one to the other of these types of internal organization, or to some modified or combined type of them. If the building is to be planned with sufficient flexibility to care for these organization changes, it will be essential to plan the facilities so they can be moved without interfering with the principal structure of the building. A space of some 3 feet between the classroom and corridor equipped with standard built-in units would provide an economical flexibility in wrap-storage space, since the built-in wardrobes or lockers could be changed from the classroom to the corridor or vice versa. This flexibility may also be secured by using cloakrooms of curtain-wall construction. The cloakrooms could then be removed entirely or turned into locker alcoves off the corridor.

Functional Approach to the Design of School Buildings

BY JOHN HANCOCK CALLENDER

STANDARDIZATION has been the keynote of American school design for the past two decades. This movement, impelled largely by idealism but partly by economy, has undoubtedly been of incalculable value. The crusading aspect of the movement has sought, with considerable success, to raise the standards of the most backward rural schools to those of the enlightened metropolis. The utilitarian aspect has succeeded in certain cities in standardizing every detail of construction and equipment, even to entire buildings, which are duplicated without change, at an obvious saving in cost. Most states have special laws covering the design and construction of school buildings, and some state codes are exceedingly detailed. Finally, if the architect, after meeting the standards of the school board and the state laws, has any freedom of design remaining, he almost invariably standardizes for himself, by making his design conform as nearly as possible to what he believes to be the "best practice" in the field.

This movement has undoubtedly been highly beneficial. But meanwhile educational theories and methods have been undergoing a constant change, amounting in the course of two decades to a revolution. The school building has been improved in various details, but has not changed fundamentally—and all the efforts toward standardization have tended to freeze it ever more solidly in the existing mold. The design of the school building has become divorced from the educational organism, and has set itself up, with its own specialists and experts, as an independent entity. The gap between, not great perhaps at present, will inevitably widen, unless there is a return to fundamental theory in school design. The school plant should be conceived primarily as one of the instruments for carrying out an educational theory. It should do more than just house the activities of the school—it should be an active and integral part of the educational process.

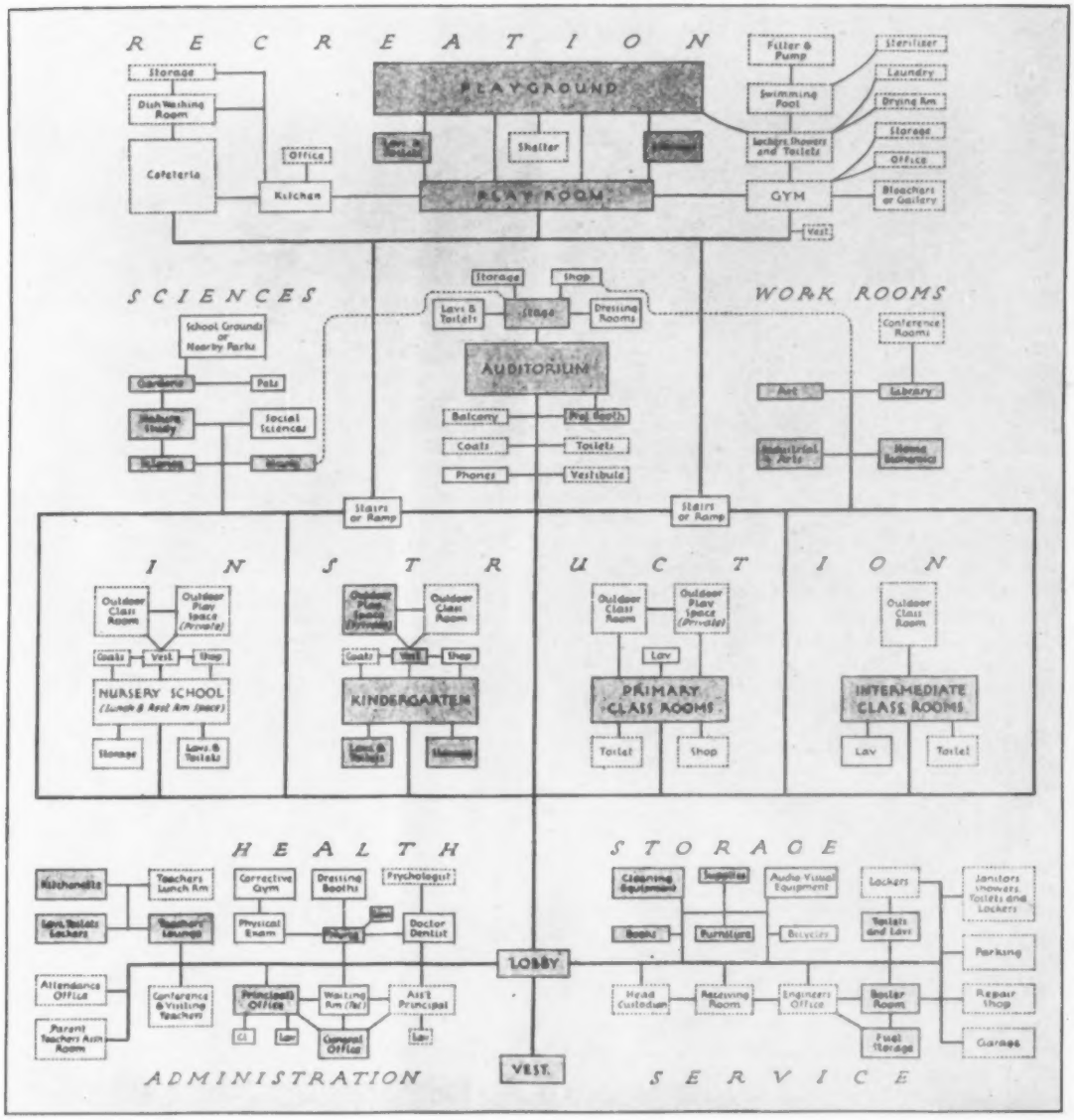
It is vastly beyond the scope of this paper to attempt to determine what the modern school should be. A suggestion for the method of approach only is offered. Stated broadly, it is that the basis for school design should lie in educational theory and not in laws, standards, and the best present practice. The design should begin with an analysis of the basic functions of the school, not in terms of rooms and equipment, but in such terms as objects of study, work, and recreation. The relationship of these primary functions to each other should be studied carefully before subordinate ones are introduced. Finally, the entire organization of the school should be worked out in considerable detail. Then, the architect's problem is to design the building that will perform these required functions most efficiently.

The Functional Chart

This analysis of the functional organization of the school may well be presented in graphic form. There are a number of advantages in such a presentation and also many incidental uses for such charts.

In the preliminary stages of the planning of a new school such a chart will be found useful to the architect and to the school board. It bridges the gap between the original written "program" (the list of required features for the proposed building) and the preliminary floor plans submitted by the architect. By this means many aspects of the organization and interrelation of the multifarious functions of a modern school can be clearly visualized in the abstract, divorced from the space-planning features that are naturally present in even the sketchiest floor plans. The functional chart is really the graphic representation of what goes on in the architect's head as he translates the verbal program into spatial concepts. It has the advantage of putting these mental processes into a visual form, enabling the architect and his client, the school board, to discuss and study the problem at this very important early stage. Furthermore, a chart of this sort is more readily comprehensible to the average business man who sits on the school board than are floor plans. The abstract diagram of functions and their relationship is familiar to the business man in the form of organization charts and similar graphic presentations of material, but floor plans of the buildings themselves usually are a mystery to him.

The chart here reproduced was prepared for the general use of architects all over the country who might be interested in designing schools. It has therefore been made as broad as possible and is naturally very different from the chart for a particular project. Nevertheless, it illustrates equally well the method of functional analysis; in this case general rather than specific. All kinds of schools—in the city slums, in the prosperous suburbs, in small towns, and in rural districts; schools with the standard regimented curriculum, and progressive schools with a full activity program; schools that serve also various community functions: adult education, recreation, community meetings, banquets, dances, plays, athletic contests; schools in the North and in the South, in the mountains and on the desert; schools for



Negroes, and private schools for the children of the wealthy—are included in this analysis. Essential features for any type of school are shaded on the chart, less essential ones are unshaded; those items required only in special cases are shown in dotted lines. The various blocks on the chart do not, of course, necessarily indicate separate rooms—in a small school several functions may be combined in one room. On the other hand, one item on the chart may indicate several rooms in the actual plan.

A similar general chart, less broad in its scope and considerably more detailed, will be of permanent value to a board of education in the study and development of its general policies of school organization and educational theory. It also lends itself readily to the presentation of various graphic statistics. For these uses, the chart should be reproduced at large scale so that there is adequate space for writing in figures, additions, changes, etc.

For the specific project of a new school, a chart for that purpose only should be prepared. The number of pupils, size and number of rooms required, specifications, equipment, and rough estimates of costs can be written in under the proper headings. The chart can thus serve as a checklist and as a visual budget.

Planning Windows for High-School Buildings

BY N. L. ENGELHARDT
PROFESSOR OF EDUCATION, TEACHERS COLLEGE, COLUMBIA UNIVERSITY
and
W. L. UHL
ARCHITECT

SIGNIFICANT changes have taken place in the use of materials for school-building construction. These changes have affected all aspects of school-building planning. An attempt has been made to discover the degree to which these changes have entered into the planning of windows in high-school buildings. With this purpose in mind, school buildings planned during each of the years 1924 to 1931 have been studied. Eight school buildings were taken for each one of these years. These school buildings have been planned by 38 architects and have been, in the main, erected in various parts of the United States so that the tabulation made represents national rather than local tendencies. The working drawings, as well as the specifications of the school buildings, have been studied in order to ascertain the facts. Wherever evidence had to be secured by visitation to the building, such visitation was made. The school buildings ranged in cost from $300,000 upward.

Table 1 discloses the dominant use of the wood sash and frame type of window for classrooms; 92.3 per cent of all windows were of this kind. Only 7.7 per cent were steel windows of various types. Of all the wood windows, 89.2 per cent were the double-hung sash with either single or mullioned openings. The wood-mullioned openings varied from one mullion to 6-mullioned group windows per classroom. The double-hung single masonry openings predominate over all types with the comparative percentage of 40.7. Next is the two-mullion (3-window group) of 14.1 per cent, then the three-mullion (4-window group) of 12.5 per cent, the one-mullion (2-window group) of 11.0 per cent, the four-mullion (5-window group)

YEAR CONSTR'D	KIND OF WINDOWS · PER MASONRY OPENING ·										
	D H WOOD (DOUBLE HUNG) (SINGLE)	D.H. WOOD 1 MULLION (2 GROUP)	D.H. WOOD 2 MULLION 3 GROUP	D.H. WOOD 3 MULLION (4 GROUP)	D.H. WOOD 4 MULLION (5 GROUP)	D.H. WOOD 5 MULLION (6 GROUP)	AUSTRAL (COUNTR-BAL (SINGLE)	STEEL AWNING TYPE 4 MUL-3 VENT	STEEL (COUNTR-BAL. (1 MUL.)	STEEL CON'L PROJ. (SINGLE)	STEEL PIVOTED (2 VENTS)
1924	IIII	I	I	I	I						
1925	IIII	I	I	I							I
1926	III	I	I	I		I		I			
1927	III	I	II			I			I		
1928	III		II	I			I		I		
1929	IIIII		I	I	I						
1930	III	I	I	II.		I					
1931	I	II		I	II		I			I	
PERCENT OF TOTAL	40.7%	11%	14.1%	12.5%	6.2%	4.7%	3.1%	.1.5%	3.1%	1.6%	1.5%

TABLE NO. 1

YEAR CONSTR'D	NUMBER OF LIGHTS OF GLASS PER WINDOW										
	4	6	8	9	12	15	16	18	24	25	30
1924		I	II					III	II		
1925					I	I	II	II	I		I
1926				I	I		I	II	II		I
1927			I					II	IIII		I
1928	I				IIII		III				
1929		I			I		I	II	III		
1930					III			III	II		
1931					I	I		III	II		I
PERCENT OF TOTAL	1.5%	3.1%	4.7%	1.5%	17.2%	3.1%	11%	26.6%	25%	—	6.2%

TABLE NO. 2

YEAR CONSTR'D	HEIGHT OF WINDOW SILL ABOVE FLOOR														AVERAGE
	2'-3"	2'-5"	2'-6"	2'-7"	2'-8"	2'-9"	2'-10"	2'-11"	3'-0"	3'-1"	3'-2"	3'-3"	3'-6"	3'-9"	
1924-25	I		IIII		II	II			IIII			II	I		2'-9¾"
1926-27		I	II		IIII		II	I	III		II			I	2'-10¼"
1928-29			III	I	III	II	I		IIIII		I				2'-9½"
1930-31		I		I	III		I	IIII	IIIII	I					2'-10¼"

NOTE :- INTERIOR WINDOW STOOL HEIGHTS FOUND GENERALLY 3" ABOVE SILLS. COMBINED SILL AVERAGE IS 2'-10" AND FOR WINDOW STOOLS 3'-1"

TABLE NO. 3

YEAR CONSTR'D	HEIGHT OF WINDOW (MASONRY OPENING)																AVERAGE
	8'-0"	8'-2"	8'-6"	8'-7"	8'-8"	8'-9"	8'-10"	8'-11"	9'-0"	9'-1"	9'-2"	9'-3"	9'-4"	9'-5"	9'-6"	9'-8"	
1924-25		I		I	I	II	II		III			II	II	I		I	9'-0"
1926-27			III	I	I	I			III	I	II	I		I	I	I	8'-8¾"
1928-29	I		II	II			I	II	III		II	I	II				8'-10"
1930-31	I		II	II		II		I	IIIIII		II						8'-9¾"

NOTE :- FOR VERTICAL LIGHT OPENING DEDUCT 10" FROM THE ABOVE DIMENSIONS COMBINED AVERAGE HEIGHT = 8'-10¾" — AND FOR LIGHT OPENING 8'-0¾"

TABLE NO. 4

of 6.2 per cent, and the five-mullion (6-window group) of 4.7 per cent.

Of the steel sash, one example of each of the following kinds was found, namely, awning vented type four-mullioned group, commercial projected single masonry opening, and pivoted two-vent type; also in single masonry opening are found each representing 1.5 per cent of the total examples compiled. With these are to be included two examples of counterbalanced steel sash in single masonry openings, representing a comparison of 3.1 per cent. Further reference to Table 1 shows that the use of wood double-hung sash of the single masonry opening type is increasing. During the last two years of the eight-year period of comparison, there appears a preference for the mullioned or grouped double-hung sash type. The table also indicates that the use of steel sash might logically be the result of preference due to the architectural style decided upon for the building wherein they were found.

In the matter of the number of lights of glass per

YEAR CONSTR'D	RATIO (IN PERCENTAGE) OF TOTAL WIDTH OF WINDOW MASONRY OPENINGS AND WALL LENGTH OF TYPICAL CLASS ROOM.																		AVERAGE %
	60	62	63	64	65	66	67	68	69	70	71	72	73	75	76	78	79	81	83	
1924-25	II			II	I	I	I		II	I	I		I	I		I		II		69.6
1926-27	IIII	I		I				IIII				I	II	I		II				67.8
1928-29	I			I			I	I	IIIII	I	II		I	I		I	I			70
1930-31	III		I				I		II	III			I		I	III			I	70.2

NOTE :- NO DEDUCTION FOR WINDOW CONSTRUCTION HAS BEEN MADE IN THE ABOVE, ALSO THE CLASS RM. LENGTH HAS BEEN USED — COMBINED AVERAGE RATIO = 69.4 %.

TABLE NO. 5

YEAR CONSTR'D	WIDTH OF WINDOW SASH (OVER ALL DIMENSION)																					AVERAGE
	2'-4"	2'-8"	2'-10"	3'-0"	3'-1"	3'-2"	3'-4"	3'-7"	3'-6"	3'-9"	3'-10"	3'-11"	4'-0"	4'-1"	4'-2"	4'-4"	4'-6"	4'-7"	4'-8"	4'-10"	5'-1"	5'-2"	5'-4"	
1924-25			I		II	I	II			I	I	I			I	I	I	I			I	I	I	3'-8"
1926-27	I	II				I					I	II	II		I		II	I	II				I	3'-11"
1928-29		I	II						I				II	I		III	IIII			I			I	4'-1"
1930-31				I		III	I	I	II	I			I			II	II	I			I			3'-10½"

NOTE :- DEDUCTIONS OF 7" FOR WOOD BOX MULLIONS AND 2" FOR JAMBS HAVE BEEN TAKEN. COMBINED AVERAGE WIDTH = 3'-10½"

TABLE NO. 6

window, Table 2 shows a general range of 4 lights in certain steel sash to 30 lights for both wood and steel windows. At the first part of the comparative period, 18-light windows are preferred, with a scattered or undecisive variety, until the middle part of the periods, when 12-, 16- and 24-light windows appear to dominate. This condition appears to continue to the close of the comparative period, when 18- and 24-light windows are finally favored.

As to the kind of glass used in classroom windows, it has been found that the selected double strength American A.A. variety of window glass is still in vogue, with a definite and increasing preference toward the "drawn" variety of window glass, which insures freedom from the numerous imperfections found in even the selected blown window glass which was standard only a few years back.

Table 3 shows the height of classroom window-sills above the finished floor. Naturally, the interest is centered in the height of the window-sill of the classroom above the floor level. The note in the table indicates that 3 inches should be added to the indicated heights of the table to secure this last figure. The table shows considerable variation in the sill heights. Three feet seems to have predominated, however, over the years studied.

In Table 4 are given the masonry opening heights for the windows of these classrooms. The trend for the eight-year period appears to be toward 9 feet for the masonry opening height. The averages for these periods appear in the table. The ratios of the width of the total masonry opening for windows as compared to the classroom length are shown in Table 5. These are expressed in percentages. The average percentage has increased slightly for the years studied, namely, from 69.6 per cent in 1924-1925 to 70.2 per cent in 1930-1931. Table 6 includes the width of window-sash for each of the years studied. There has been a variation in the average over this period. There is a wide spread of different widths used in each of the years studied. Apparently, there is no fixed practice or fixed tendency. It seems that the architect has accepted the opportunity of allowing his type of architecture and general design to decide window widths.

—The six tabulations here presented have been prepared by W. L. Uhl for the Department of Educational Administration, Teachers College, Columbia University, New York.

GOVERNMENT DEPARTMENTS WHICH HAVE MOTION PICTURE FILMS FOR FREE DISTRIBUTION

(A List issued March, 1934, by the U. S. Office of Education)

Office of Motion Pictures,
U. S. Department of Agriculture,
Washington, D. C.

Army Pictorial Service,
U. S. War Department,
Munitions Building,
Washington, D. C.

Division of Venereal Diseases,
Bureau of Public Health,
U. S. Treasury Department,
Washington, D. C.

Motion Picture Productions Section,
Bureau of Mines,
U. S. Department of Commerce,
Washington, D. C.

Chief, Bureau of Navigation,
U. S. Navy Department,
Washington, D. C.

Division of Reclamation Economics,
Bureau of Reclamation,
U. S. Department of the Interior,
Washington, D. C.

Branch of Research and Education,
Office of National Parks, Buildings, and Reservations,
U. S. Department of the Interior,
Washington, D. C.

Division of Publicity,
Women's Bureau,
U. S. Department of Labor,
Washington, D. C.

The Motion Picture Section of the Bureau of Foreign and Domestic Commerce, Department of Commerce, Washington, D. C., supplies data as to motion picture subject matter and statistical information.

Departments of state governments, such as education, agriculture, and highways, and city school systems, sometimes have motion picture films to loan.

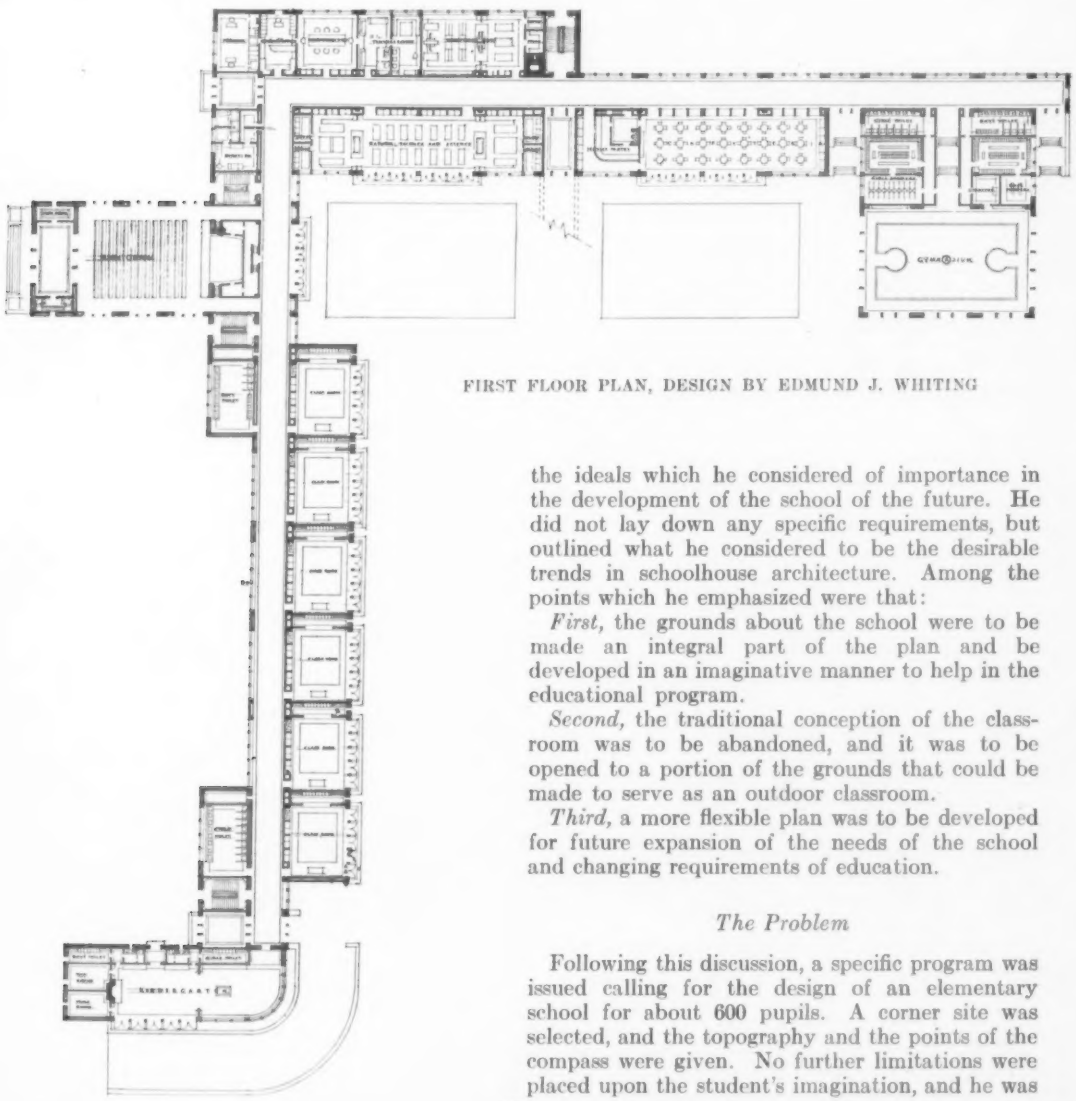
Getting a Fresh Viewpoint on School Planning

BY H. VANDERVOORT WALSH
OF CRAFT, GILL & WALSH, ARCHITECTS, NEW YORK
ASSISTANT PROFESSOR, SCHOOL OF ARCHITECTURE, COLUMBIA UNIVERSITY

STANDARDIZATION in school-building equipment and design sometimes blocks progress in a subtle manner. Things that become standards seem to be fixed, as though the last word had been said on the subject. They take on an air of finality which does not stimulate fresh attempts to solve the problem from new angles and approaches. Veteran designers accumulate data and ways of doing things that tend to make them repeat old ideas which may need radical changes.

To direct the minds of young architects, free of tradition, toward the solution of the old problem of schoolhouse planning was an experiment carried on in the School of Architecture, Columbia University, under the inspiration of Prof. N. L. Engelhardt of Teachers College. Very interesting solutions resulted, and three of them are published with this article.

Before assigning a specific problem to the students, Professor Engelhardt discussed with them



FIRST FLOOR PLAN, DESIGN BY EDMUND J. WHITING

the ideals which he considered of importance in the development of the school of the future. He did not lay down any specific requirements, but outlined what he considered to be the desirable trends in schoolhouse architecture. Among the points which he emphasized were that:

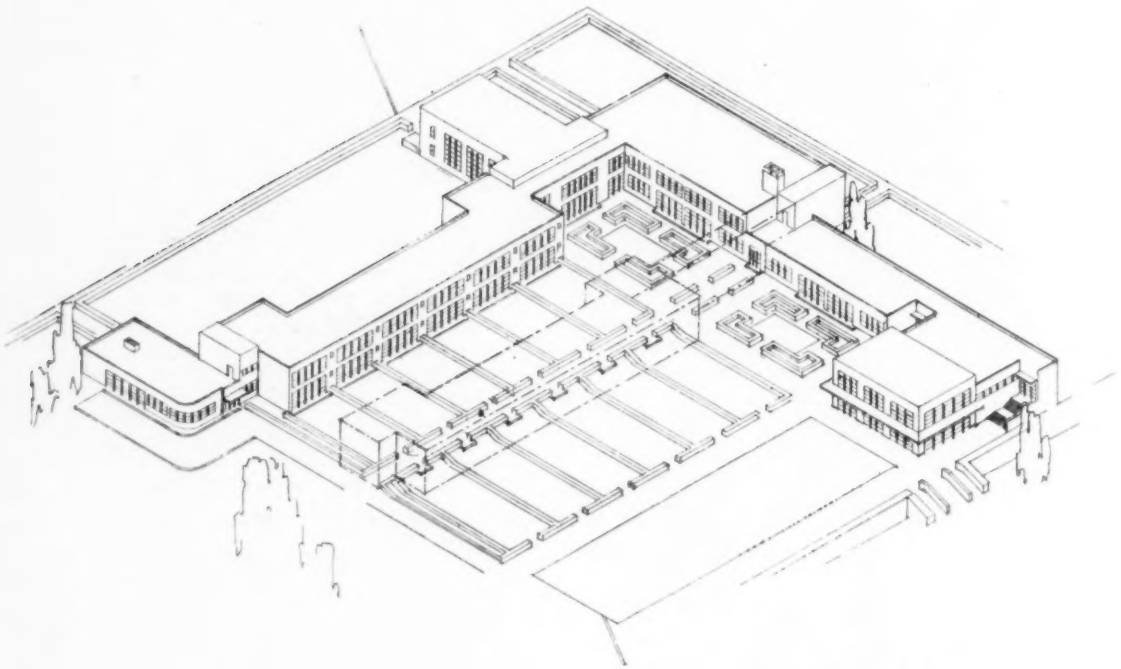
First, the grounds about the school were to be made an integral part of the plan and be developed in an imaginative manner to help in the educational program.

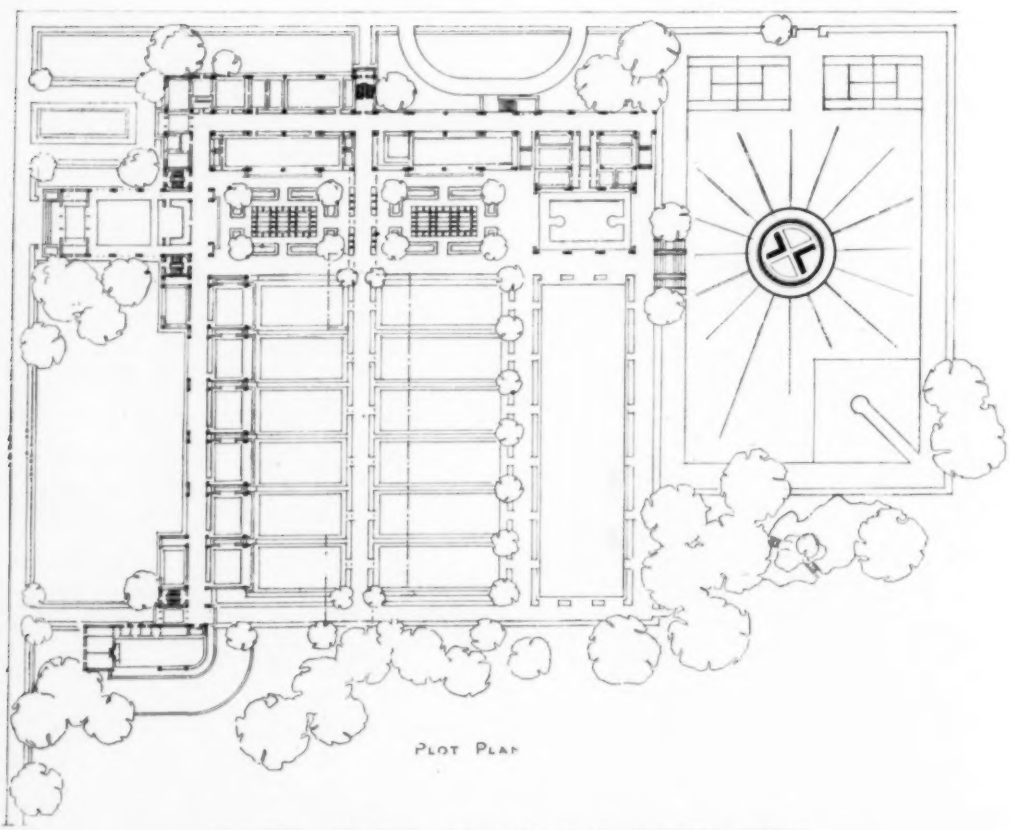
Second, the traditional conception of the classroom was to be abandoned, and it was to be opened to a portion of the grounds that could be made to serve as an outdoor classroom.

Third, a more flexible plan was to be developed for future expansion of the needs of the school and changing requirements of education.

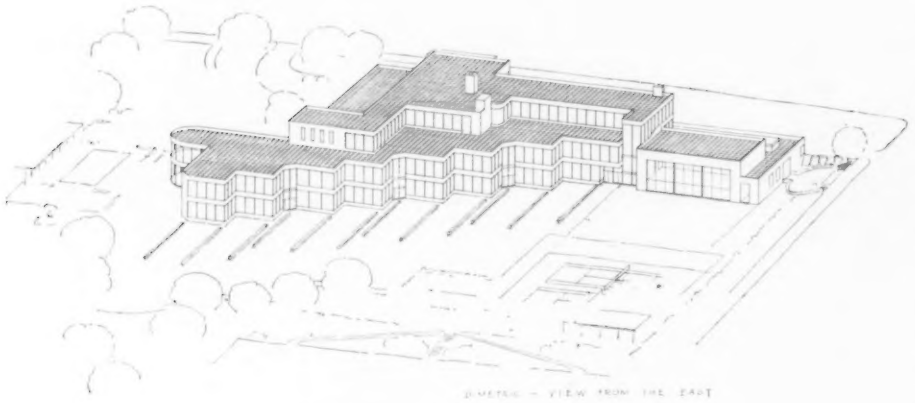
The Problem

Following this discussion, a specific program was issued calling for the design of an elementary school for about 600 pupils. A corner site was selected, and the topography and the points of the compass were given. No further limitations were placed upon the student's imagination, and he was

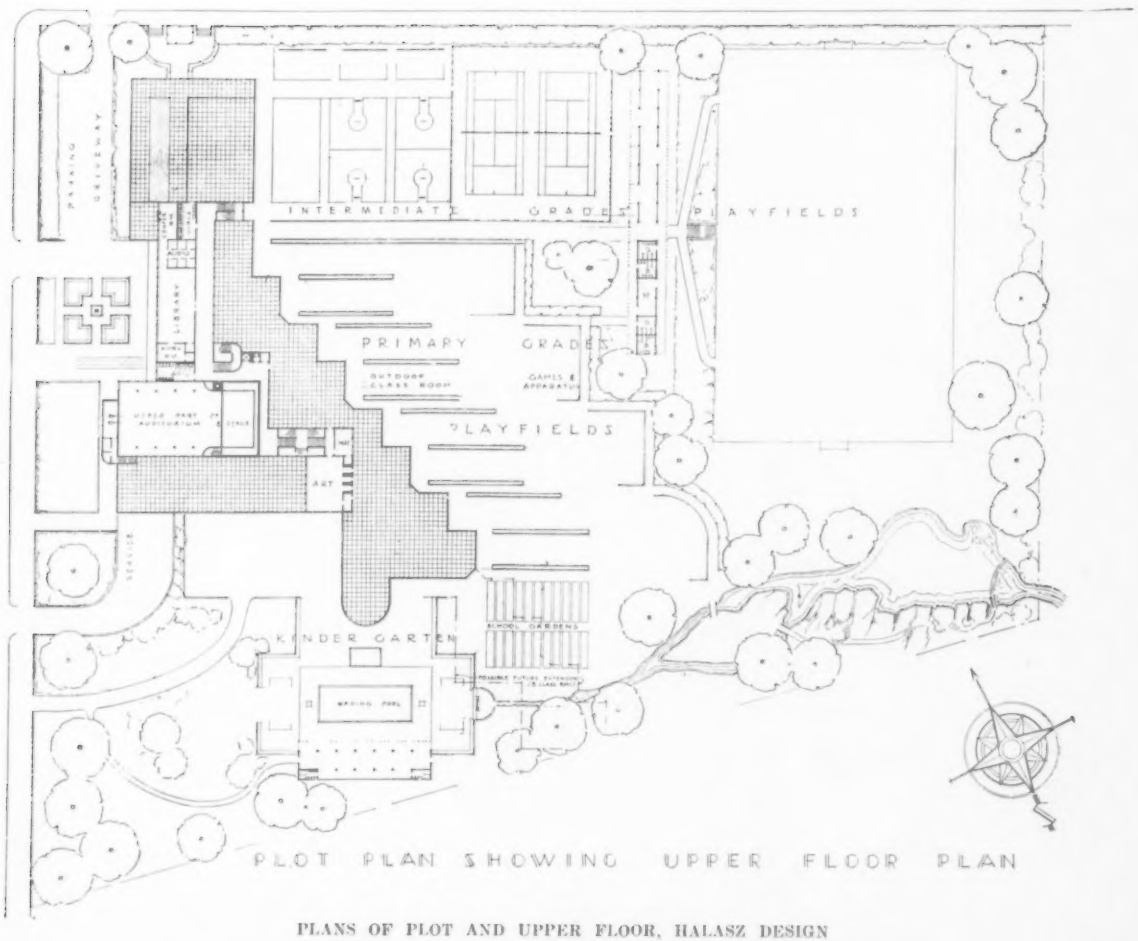




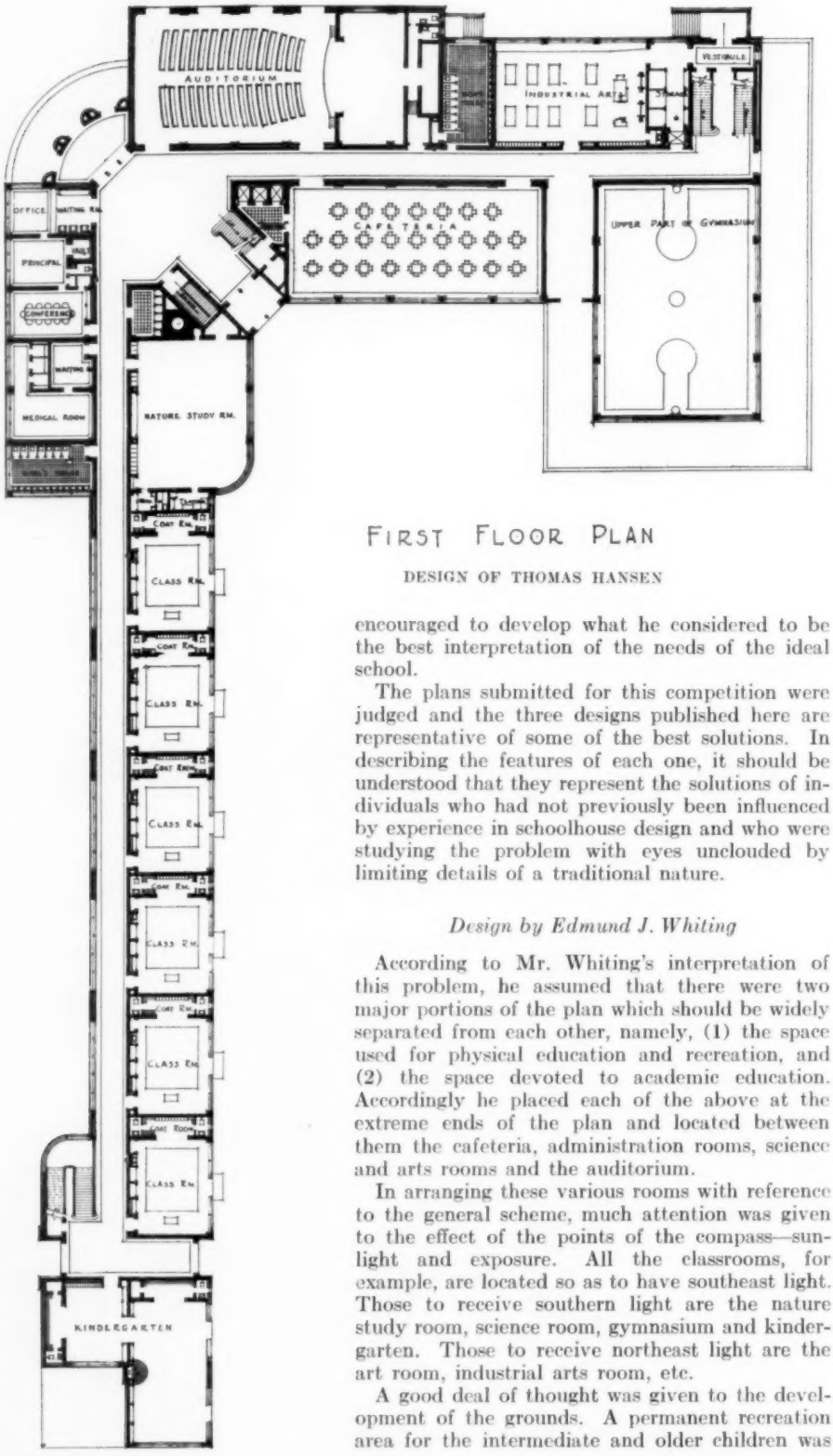
ISOMETRIC DRAWING AND PLOT PLAN, WHITING DESIGN



DIMETRIC VIEW, DESIGN BY ANDRE HALASZ



PLANS OF PLOT AND UPPER FLOOR, HALASZ DESIGN



FIRST FLOOR PLAN

DESIGN OF THOMAS HANSEN

encouraged to develop what he considered to be the best interpretation of the needs of the ideal school.

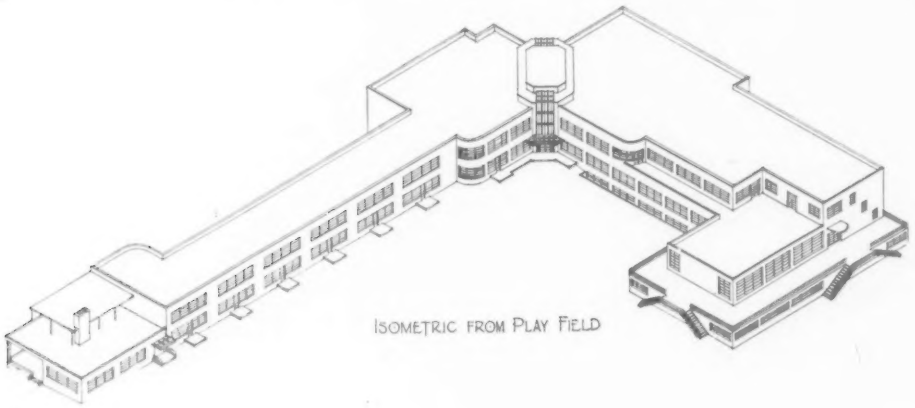
The plans submitted for this competition were judged and the three designs published here are representative of some of the best solutions. In describing the features of each one, it should be understood that they represent the solutions of individuals who had not previously been influenced by experience in schoolhouse design and who were studying the problem with eyes unclouded by limiting details of a traditional nature.

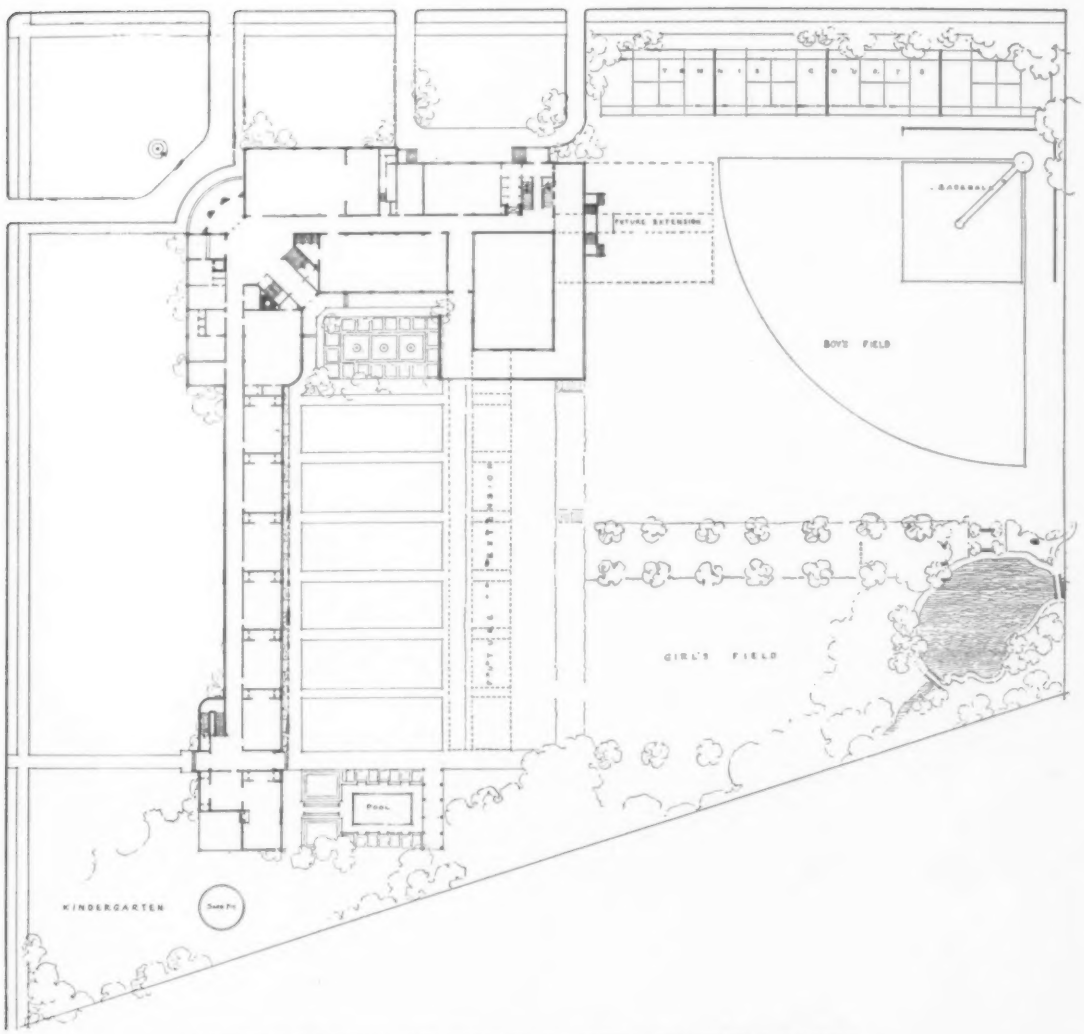
Design by Edmund J. Whiting

According to Mr. Whiting's interpretation of this problem, he assumed that there were two major portions of the plan which should be widely separated from each other, namely, (1) the space used for physical education and recreation, and (2) the space devoted to academic education. Accordingly he placed each of the above at the extreme ends of the plan and located between them the cafeteria, administration rooms, science and arts rooms and the auditorium.

In arranging these various rooms with reference to the general scheme, much attention was given to the effect of the points of the compass—sunlight and exposure. All the classrooms, for example, are located so as to have southeast light. Those to receive southern light are the nature study room, science room, gymnasium and kindergarten. Those to receive northeast light are the art room, industrial arts room, etc.

A good deal of thought was given to the development of the grounds. A permanent recreation area for the intermediate and older children was





ISOMETRIC DRAWING AND PLOT PLAN, DESIGN BY THOMAS HANSEN

planned to open from the gymnasium. Play ground for primary grades, which need supervision, was placed next to the outdoor classrooms.

Other consideration was given to the design of individual units, such as a kindergarten, which is definitely separated from the rest of the building, having its own entrance and play area. The auditorium also has a separate entrance, to permit it to be used for community purposes.

Design by Andre Halasz

Mr. Halasz sought to break away entirely from the traditional school, and although his plan has some features that might be criticized, it has others that are very unusual and worth consideration. He placed primary importance upon the informal classroom and provided each one with light from two sides, thereby developing a zigzag plan of unusual appearance. Opening from each classroom is space for an outdoor class which more or less fits within the pocket created by the stepped plan.

Owing to the unusual arrangement of the classes, long, straight corridors were eliminated. By taking advantage of the different levels of the ground, direct access was obtained on two floors, thereby relieving the traffic on the stairs. This designer believes that the auditorium, unlike the other plan, should not be used by the community, but only by the children.

Design of Thomas Hansen

The point of view of this designer is primarily the condition imposed by the site. He considered that the building should be essentially L-shaped, since it is on a corner lot, and that the entrance therefore should be on the corner. The one wing which permits southern and southeast exposure was considered to be the only place for the classrooms. The auditorium, cafeteria, and gymnasium were grouped together particularly for the purpose of permitting the auditorium to be used by the community for social functions. To avoid disturbing the quiet of classrooms, the gymnasium was placed as far from them as possible.

As the entrance is on the corner, the administration offices were grouped around it, and also the teachers' rooms and medical clinic.

The higher portion of the property is used for the building proper and the lower portion for the playground. Open-air classrooms are also a feature of this plan.

The New Language and Literature Building of Bucknell University

BY HOMER P. RAINEY

PRESIDENT, BUCKNELL UNIVERSITY, LEWISBURG, PA.

BUCKNELL UNIVERSITY has inaugurated an enlarged program in an endeavor to fulfill, for the present-day youth, the true function of the liberal college—that of liberalizing and enriching the lives of its students. It aims to accomplish this through a new emphasis on the fine arts and the encouragement of creative expression in this field as well as in the more usual fields of academic subjects.

This program embraces two major developments: one a changed curriculum; the other, a carefully-planned extension of the physical appointments of the college, namely, an enlarged campus and new building units.

The Need and the Present Buildings

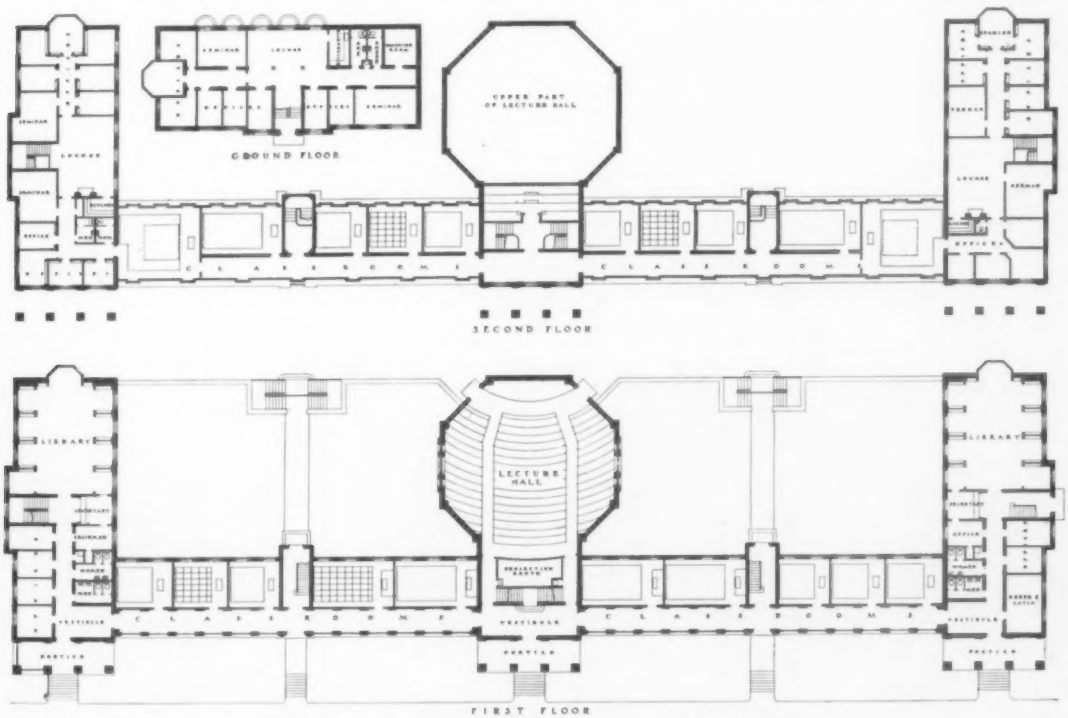
One development is complementary to the other. The curriculum requires increased facilities. With the recognition of the creative and expressive functions of the arts and social sciences and the encouragement of creative work among the students comes a need for more buildings devoted to this type of study. Consequently, the new building program has been started simultaneously with the reorganization of courses.

The building plan and landscaping of the campus are the work of Jens Fredrick Larson, of Hanover, N. H., a specialist in college architecture. After a survey of the locality and a study of the predominating style of the present college buildings, he has planned the future structures to conform to the original patterns and to express the finest local architectural traditions. The college site of 230 acres, much of it on a plateau overlooking the Susquehanna River, offers an ideal opportunity for effective expansion. Its present buildings, twenty-four in number, are grouped at one end of this area on a wooded slope above the river, and form a natural approach to the newer building units.

LOOKING ALONG THE FRONT OF THE BUILDING.
The rear view is shown on page 52

The Plan of the New Building

The first of these new buildings has recently been opened for use. It is the language and literature unit, which will house all the major activities



LITERATURE GROUP AT BUCKNELL UNIVERSITY

Courtesy of Jens Fredrick Larson, Architect

FLOOR PLANS, LANGUAGE AND LITERATURE BUILDING, BUCKNELL UNIVERSITY

These show the layout of the entire proposed building, only a part of which is shown in the photographs

of this division of study. Though complete as it now stands, it allows for the addition of another wing when necessity requires it.

It is a long, low structure of red brick, harmonizing with the earlier buildings on the campus, of modified Colonial design, with decorative features which repeat the characteristics of the outstanding edifice of the original campus, stately "Old Main." It consists of a central unit and north and south wings, connected by covered porticos which run along the front of the building and afford a view of the hills surrounding the site. An hexagonal auditorium with a seating capacity of 450 forms the central unit of the completed building. It is used for lectures, group examinations, and student gatherings of various sorts, and is provided with a projection room for stereopticon, motion picture, and sound equipment, and with a visitors' gallery and lecturer's study. A blue ceiling, high, small-paned windows curtained in blue velvet, deep blue leather seats, and the rich draperies of the stage, are features that make for beauty and comfort in the auditorium.

The wings at either end of the building provide faculty offices, department libraries, seminar rooms, and lounges. All these are attractive in furnishings and appointments and surround students with the beauty and taste that are conducive to fine living. The language library, with its soft-stained wood finish, Colonial furniture, oriel window, and alcoves for special book collections, invites one to linger for casual reading as well as for study. The seminar rooms, with large central table, book nooks, and decorations suggestive of the subjects under consideration, make informal group discussions an attractive as well as valuable method of study. The main lounge, with its fireplace, comfortable chairs, kitchenette facilities, and other homelike appointments, affords a social meeting place for faculty and students.

The several faculty offices give the teaching staff the privacy which they need for study and interviews, and have an important place in the working equipment of a professor who tries to be not only a teacher but a friend, advisor, and creative worker.

The twenty classrooms range along the inner side of the porticos which connect the wings to the central unit of the building, each room opening out onto the long passageway. The rooms vary in size, seating from thirty to seventy students, and each has windows looking out toward the open campus on the east and a view through the doorway and portico to the hills to the west. The building is air-conditioned and comfortable in all weather.

The New Campus Group

This building is the first of a proposed group of eight or more on the new campus. Others provided for in the architect's plan are a library to replace the present one, science building, social science hall, administration unit, chapel, field house, student union, fraternity and faculty residences. "Old Main," which crowns college hill and is the central building of the older campus, will be made into a student union to provide appropriate rooms for the many extra-curricular activities. This building when erected in 1850 was the second largest college building in the country. It was planned by Thomas U. Walter, one of the architects of the Capitol at Washington. In the proposed project, it will continue in its important position as the social center of the men's campus at Bucknell.

In addition to the buildings "on the hill," the plan calls for further construction on the women's campus. Most important among these proposed buildings is the large auditorium. Also included are a gymnasium for women, and a little theater, made from one of the small auditoriums already located on this part of the campus.

An architect's model of the complete campus, with present and proposed buildings in miniature modeled to scale and placed in the setting which they will occupy, is now on exhibit in the college library, keeping constantly before friends and students a vision of the Bucknell of the future.

While the plans of the Trustees call for much of the architectural program to be completed by 1946, Bucknell's one-hundredth anniversary, no special disappointment will be felt if the goal is not reached, for it is recognized that this is an extensive and ambitious program.

The Construction Program of The University of Texas, 1925-35

BY W. J. BATTLE
CHAIRMAN OF THE BUILDING COMMITTEE OF THE FACULTY,
AND
H. Y. BENEDICT
PRESIDENT OF THE UNIVERSITY

AS a result of its ten-year construction program, The University of Texas, which during the first quarter of the twentieth century was housed largely in unpainted wooden shacks with tar-paper covered roofs, will find itself by 1935 in an almost complete and adequate plant whose principal and permanent buildings have been designed to produce architectural unity without sacrificing variety, beauty, or utility.

The financing of this construction program involved unique and interesting details. Except for the central fact that petroleum was the main source of the construction money, many of these details are unknown and little appreciated even in Texas.

Texas alone among the forty-eight states had been an independent republic, and in entering the Union it retained title to its public lands. Of these, at first 50 leagues were set apart, and afterwards 2,000,000 acres, for the establishment and maintenance of a "University of the first class." The latter lands have been leased to stockmen, and since 1900 have produced an annual grass rental that has slowly risen from $40,000 to nearly $300,000. In 1923, in one of the large University pastures, oil was discovered. Since then, oil has been found in several other similar places, and by September 1, 1935, the total money derived from oil royalties and bonuses on University lands will amount to about $21,000,000. This is endowment money, of which only the income may be spent.

Because of its large land holdings, it was at first contemplated that the University would be supported out of income from endowment, increased a little by very low student fees. Therefore, the constitution of Texas contains the unique provision that no tax money may be spent for erecting buildings at The University of Texas.

The total money for running expenses continuing to be inadequate, the Regents of the University, about 1908, deliberately chose to put money into teaching and equipment rather than into buildings. Hence the combination of wooden shacks, above referred to, and the membership of the University in the Association of American Universities and other exclusive educational associations.

In view of the need of buildings and the constitutional provision above mentioned, the Regents continued for many years to ask the Legislature to appropriate out of taxes enough money to run the University and thereby to leave its income from endowment free for the erection of buildings. Curiously enough, about the time oil was being discovered on University land, this request was granted, and the Legislature passed an act devoting the University income from endowment to the erection of buildings and permanent improvements. This act remained in force until 1933 and resulted in the expenditure out of income, 1925-1933, at Austin and Galveston, of about $6,000,000 for buildings and other permanent improvements. In addition, so great was the need of buildings at the University, the Legislature submitted and the people voted in 1930 an amendment to the constitution permitting the University to spend $4,000,000 out of the endowment for buildings, to be repaid within twelve years.

In addition to expenditures out of public funds, the Sealy and Smith Foundation at Galveston has expended more than a million dollars on a Nurses Home, an Out-Patient Clinic, and a power plant for the Medical Branch. At Austin, the late George W. Littlefield, a former Regent, has given $300,000 for the Alice Littlefield Dormitory for freshman girls, $250,000 for the Littlefield Memorial entrance, and over $400,000 for the Main Library. Lastly, over $300,000 donated by ex-students and friends of the University, under the leadership of the Hon. T. W. Gregory, a former Regent and Attorney-General of the United States, has been spent in helping to erect the Student Union and gymnasiums for men and women.

The University buildings of the period 1925-1935 erected from endowment income or from loans from the endowment fund are as follows: Garrison Hall, a classroom building for social sciences; the power plant; gymnasiums for men and women; Waggener Hall (business administration); buildings for chemistry, physics, home economics, engineering, architecture, and geology; Hogg Auditorium and Union-Cafeteria; Brackenridge Hall, a men's dormitory; the University High School, the laboratory school of the School of Education. They are built in a form of Spanish Renaissance, modified to suit local needs and materials. This style was first used in the Old Library (1911) by Cass Gilbert, who had lately been appointed University architect. It has a certain propriety in view of the Spanish heritage of Texas as a part of Mexico. Its two most obvious characteristics—the broad, highly ornamented cornice and the high tiled roof—are inspired by buildings in Saragossa, especially the Exchange. Gilbert's Old Library is

faced with limestone of a charming cream color, but the next building, Sutton Hall, designed by Gilbert, has only the first story of stone, the others being of a light brick.

Materials and Effects

This combination of stone and brick has been followed in most of the subsequent buildings, but some are faced wholly with stone and several are all brick except the trimmings. The University is fortunate in having excellent stone quarries close to Austin, yielding the stones now known as Cordova Cream and Cordova Shell, each good both in color and texture and combining well with each other and with certain tones of brick. The only exception to the use of Texas materials for walls is the Indiana limestone of the New Library, adopted because of its superior hardness.

Where decoration is used, an effort has been made to employ mainly Texas motives, such as Texas flowers and animals, Texas products, names and objects from Texas history. The results are good.

In all the new buildings great care was taken alike in planning and in construction. Adaptation to purpose has been the controlling factor in the planning, with regard also to the rapidly changing methods of modern teaching. The construction is fireproof throughout, and substantial, and the best materials have been employed—this, of course, in the hope of reducing repair costs to a minimum.

GARRISON HALL
Social Sciences Building

Yet the exterior has not been neglected. Little use is made of ornament, and effect is gained chiefly by properly related masses, by variety of outline, and by just proportions. The dominating feature of the Campus is to be the New Library with its book tower over 300 feet high. The old Main Building is now being razed to make way for this new and monumental building, to be finished in 1935 or 1936.

The Architects

Cass Gilbert was succeeded as University architect in 1923 by Herbert M. Greene, of Dallas; Mr. Greene, by the firm of Greene, LaRoche, and Dahl, which served in this capacity through 1933. In 1930 Paul P. Cret of Philadelphia was engaged to develop a campus plan, and a year later he was made consulting architect. All buildings erected since this date bear the mark of his fine judgment and taste. For the Hogg Auditorium and the Union-Cafeteria, for the proposed completion of the New Library, and for the two new dormitories to be erected out of PWA loans, the local architect is R. Leon White, of the University Faculty.

ARCHITECTURE BUILDING

The Campus and the Grouping of the Buildings

The original Campus of the University, set apart in the days of the Republic, was a tract of forty acres covered with trees, mostly live oaks,

SUTTON HALL
School of Education

lying about half a mile north of the Capitol, the highest ground in the city's limits at that time. Many of the live oaks were cut down for military reasons in the Civil War. Those that survive are cherished for their historic associations as well as for their beauty. In the center rises a hill with gently sloping sides commanding fine views in all directions. On this hill was erected the first building of the University, the Main Building, and, very slowly, subsequent buildings were grouped around it.

In recent years the Legislature has added some 150 acres to the original Campus, and a number of buildings have been erected on the new tracts. Nevertheless, the "Forty Acres" still contain the greater number of the University buildings and are still the center of University life and activity.

Mr. Cret's plan for the development of the Campus breaks up the buildings into several groups, each with its special character and interest.

The new buildings of the northeast group are devoted to science,—biology, physics, chemistry, geology,—embodying the most modern ideas of what is needed in science buildings. To insure this, not only the architects but members of the Faculty visited the best institutions all over the country and made careful studies. Sundry original features promise good results. These laboratory buildings are not ambitious architecturally, but they are all interesting, especially the Physics Building, which has an unusually varied outline and fenestration, and the Geology Building, which has a notable frieze halfway up, showing sundry forms in the development of life.

The southeast corner of the Campus contains buildings for business administration, social sciences, and law. The main exterior feature of Waggener Hall (business administration) is a series of terra cotta plaques in color representing the chief products of Texas. Garrison Hall (social sciences) is decorated with famous cattle brands and the names of great men of the Republic of Texas. The Law Building is plain outside, but inside one can see photographs of every law graduate of the University, showing him as he looked in his student days!

In the southwest corner of the Forty Acres are three buildings—the Old Library, Sutton Hall (administrative offices and the School of Education), and the Architecture Building.

The Old Library, by Cass Gilbert, has one of the most beautiful façades in America—a solid base broken by square-topped windows and a delicately sculptured doorway, a range of huge arched windows bordered by bands of colored terra cotta, lovely tondi in the spandrels containing the signs of the zodiac in white on a blue background, and a cornice of great richness both of modeling and of color. In the interior the reading room is remarkable for its fine proportions, its painted open-timber ceiling, and its elaborately carved doors.

HOGG MEMORIAL AUDITORIUM

DESIGN FOR THE NEW LIBRARY

The Architecture Building is built around a patio, thus obtaining uniformly good light for the drawing rooms. The library and main lecture hall ceilings were decorated under the direction and mostly by the actual hands of former students of the University.

In the northwest corner of the Forty Acres are the Union, the Hogg Auditorium, and a dormitory for women.

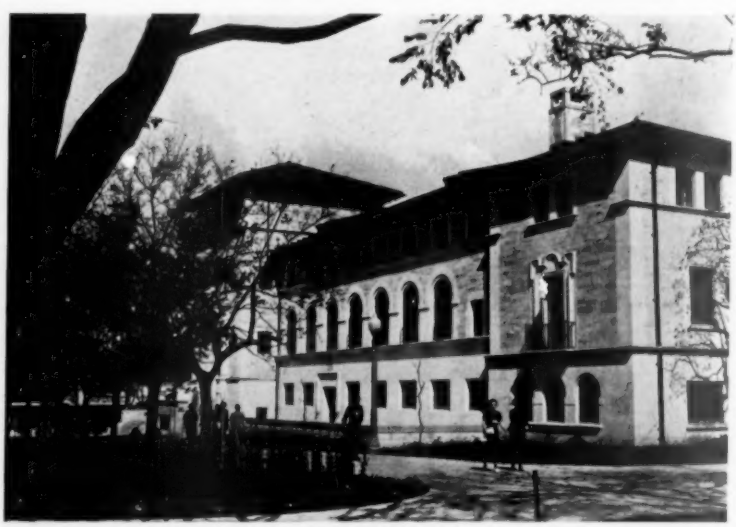
The New Library

Struck by the beauty of the central hill of the Forty Acres, Mr. Cret decided that it should be the site of the largest and most important building, dominating the whole Campus by its size and monumental character. The New Library, being inevitably the largest and most important building, must therefore logically stand there even if it involved the destruction of the Main Building. A beginning was made by setting the first unit of the Library on the site of the north wing of the Main Building. Here everybody supposed the demolition of the Main Building would halt for many years, but the National Government's grant of a loan at 4 per cent and an outright gift of 30 per cent of the cost of the building have made possible the filling-out of all the main lines of the Library scheme. The whole building will certainly not be needed for books for a long time, but it will be adapted to administrative and teaching purposes without undue violence either to the design or the use of the rest of the building as a library.

The plan of the Library is, in general, that of most recent university libraries—a great book-stack with reading rooms in front and on the sides and the delivery room in the center. The distinctive features are the two wings stretching out like welcoming arms, a great arcaded loggia connecting the wings, the unusually large and fine delivery room, and the lofty stack tower rising to a total height of 307 feet and terminating in a graceful columnar belfry with clock and bells.

As its importance demands, the Library shows, both inside and outside, more decoration than any other of the new buildings. Outside there is a good deal of architectural relief work; under the cornice are set in full color the coats of arms of twelve historic universities; below the great windows are the names of great masters in literature; between the stack windows stand in gold the letters of the five great alphabets through which the libraries of western civilization became possible—Egyptian, Phenician, Hebrew, Greek, Roman.

In the interior the most notable decoration is



THE UNION

found in the delivery room, where are represented in painted relief the coats of arms of the six governments under which Texas has lived —Spain, France, Mexico, the Republic of Texas, the Confederacy, the United States—with a sentence or two under each expressing its main governmental ideals. In the West Reading Room the ceiling beams are decorated in color with symbols of the several periods of the history of Texas, and the brackets supporting the beams bear the coats of arms of the old world peoples whose descendants make up the population of Texas. In the East Reading Room on the ceiling beams are painted notable utterances from the past that will do modern boys and girls no harm if peradventure they see them. Here the beam brackets bear each a famous printer's mark. All the painted decoration of the Library was done by Eugene Gilboe. There is also a good deal of walnut carving by Peter Mansbendel, perhaps the best being the coats of arms in the Spanish room that were used by the Franciscan Order and by the first explorer of Texas, Cabeza de Vaca.

PHYSICS BUILDING

The Union

The Union is one of the most attractive of the new buildings. The first floor houses the general eating arrangements of the Campus. The controlling element is the Commons (a cafeteria) occupying a large room whose low ceiling is redeemed by an unusually effective terrazzo floor. Under the Commons' management are a number of private dining rooms, a cold-drink room, and a lunch room. The lunch room, called The Chuck Wagon, is decorated with steer heads, cacti, rattlesnakes, cattle brands, and other symbols of cowboy life.

Above the first floor the Union Building is devoted to student extra-curricular activities. From a fine lobby, decorated with carved walnut medallions of the presidents of the University, open off a huge coeducational lounge, used also for University dances, a separate men's lounge and another for women, sundry offices and club rooms, and the headquarters of the Ex-students' Association. The third floor and tower are given over to club rooms of various sizes. The whole building is tastefully furnished, mainly from funds saved by the Students' Association out of University dance receipts.

GEOLOGY BUILDING

The exterior bears in relief the totems of several of the colleges and schools of the University—the Owl of Arts and Sciences, the Peregrinus of Law, the Alexander Frederick Claire of the Engineers, the Mercury of Business Administration, all humorously treated.

For Various Uses

The Hogg Auditorium is a happy combination of theater and lecture hall. The stage has all sorts of curtains and scenery and lighting arrangements, and the seats are provided with tablet arms for note-taking. The seating capacity is about 1,350. Behind the building space has been left for a Little Theater, the

two stages to be back to back. Great care has been taken to make the acoustics good. Both inside and out, the building has a remarkably individual note.

North of the Forty Acres lies what is generally known as the Woman's Campus. Here, close to the Forty Acre line, is the Home Economics Building, regarded by many as the best of the University's new buildings. It is of large size, built on three sides of a patio, picturesque in outline, planned with more than usually affectionate care by the Home Economics staff. It would seem that not only every existing invention in home economics but every conceivable device had been included. Yet, for all its modernity, the building is dedicated to the Pioneer Women of Texas, and over the front door there is a relief of a pioneer mother with a young son. In one corner of the basement is a white-rattery for raising subjects for food experimentation.

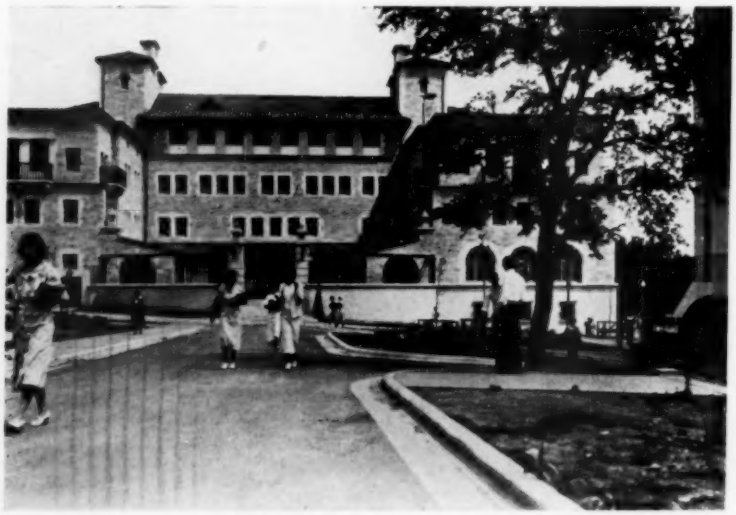
Other buildings on the Woman's Campus are the Littlefield Dormitory for freshman girls—a notable outcome of a notable bequest—and the Women's Gymnasium. There can be few women's gymnasiums in the country larger or better planned than this. Everything seems to have been thought of that could promote women students' health and bodily activity—a large swimming pool, of course, dancing floors, correction rooms, even sunbath spaces. Adjacent are the women's playing fields for tennis, archery, hockey, and divers other things. Another dormitory for women is under plan.

BIOLOGICAL LABORATORY

Directly east of the Forty Acres are the College of Engineering and the Power Building; the men's gymnasium, Clark baseball field, the Memorial Stadium and various tennis courts.

The Engineering College occupies one enormous building four stories high in front, connected behind with one- and two-storied laboratories and shops planned for utility even more than the other buildings. For all that, it is hardly less pleasing to look at. It is another illustration of the truth that in architecture as in the human body proper regard for function results also in beauty. By way of decoration the exterior bears terra cotta reliefs of engineering achievements and the badges representing the great engineering societies.

The Power Building is also a pleasing example of functional architecture. Here the machinery was thought out first and the building put around it. Decorative features on the exterior are names of famous masters of mechanics and relief plaques illustrative of sundry famous mechanical principles.



HOME ECONOMICS BUILDING

Functional architecture, however, has not produced beauty in any of the men's athletic buildings. The men's gymnasium and the stadium are well planned and substantially constructed and are imposing in size, but more than that can hardly be said. As usual, the attempt to make an auditorium out of a huge gymnasium has failed despite herculean efforts on the part of the amplification experts. On the other hand, the superb maple floor and huge balco-

nies make a fine place for basketball matches and grand dances too big for the Union. Even governors' inauguration balls take place here and operas and speeches at which audiences of several thousand are expected.

The stadium seats now some 43,000 people; and when the additional seats, originally contemplated, are added to the perimeter, it will hold 58,000. It was erected by popular subscription at a cost of nearly half a million dollars while instruction was still being conducted in over a score of unpainted shacks. The grandstand of Clark baseball field is even less beautiful than the stadium and also smaller, but it is plenty large enough for all who want to see college baseball games nowadays.

A CAMPUS WALK

Extreme left, old library; center, biological laboratory; right, new library and main building (now demolished)

Southeast of the Forty Acres extends a great tract devoted partly to men's dormitories (there is one now and another will be erected shortly) and partly to playing fields. The dormitory is built on the unit system with beds for 146 men in all. An unusual feature is the sleeping porches, six with a capacity of ten each by the use of double-decked beds. The climate of Texas is favorable for outdoor sleeping, and sleeping porches are extremely popular. An interesting feature of the exterior is the symbols of cowboy life done in terra cotta relief on a stucco background—bucking bronco, coyote, six-shooter, fence wire, and the like.

Further to the southeast than the men's dormitory group stands the University High School, a junior high school accommodating some 800 children, erected by the University and conducted by the city of Austin as a model junior high school and educational laboratory for the University School of Education. It is a low building covering a great extent of ground after the type so common in California.

The Main Entrance

Whatever may be said of the new buildings, The University of Texas is certainly unique in the size and imposing character of its main entrance. Here has been erected a monumental foundation in granite and bronze, commemorating the heroism of the South in the Civil War and of the Nation in the World War. It consists of a series of three pools with a great symbolic bronze group rising in the center and bronze statues of six statesmen placed along the walks leading to the Main Building. The statuary is by Pompeo Coppini; the architectural setting by Mr. Cret.

The effect of these beautiful buildings upon the student body is interesting to observe. It is already obvious that they will be the physical basis for finer social and intellectual traditions.

ENGINEERING BUILDING

The Weequahic High School in Newark

BY JOHN H. LOGAN

SUPERINTENDENT OF SCHOOLS, NEWARK, N. J.

THE Weequahic High School, the latest institution to be erected by the Board of Education of the city of Newark, was opened in September, 1932. The cost of the land, including an athletic field 250 feet by 580 feet, was $321,282. The cost of the building was $1,018,360, and the equipment $21,333.

The building is of modern type architecture and is unique for this city in that immediately alongside it stands a recently erected elementary school similar in architecture and decorated throughout in the same modern style. The two buildings together make a handsome educational unit. There are two principals in charge, and these administrators have already made valuable contacts not otherwise possible. They are preparing for still closer correlation of the work of the two schools. Part of the elementary school building has been used since the opening of the Weequahic High School to accommodate ninth grade classes because of the overcrowded conditions in the high school.

The front of the building is on Chancellor Avenue, Aldine Street is on the left, the Chancellor Avenue Elementary School on the right, and Vassar Avenue in the rear. The area of the plot is 43,260 square feet. The building is constructed of brick; it is five stories in height, and has five entrances. The width of the staircases is 5½ feet, and there are smoke-proof doors on every floor at each stairway. The auditorium of the building, situated on the ground and first floors, has a seating capacity of 1,000. The stage is 24¾ feet by 65 feet. The auditorium is provided with a fire-resistive motion picture booth, but not as yet with motion picture apparatus.

Rooms and Facilities

The school has 57 classrooms and 1,800 pupil stations. Included in the facilities are two manual training rooms, a mechanical drawing room, a shop, two art rooms, and two domestic science rooms. In addition, there is a model apartment consisting of a living room, a dining room, and a bathroom. A physics laboratory and a chemistry laboratory, together with a special workroom for the biological classes, are provided for the science department. Two rooms are provided for the music work; one is sound-proof and the other is equipped with piano, platform, etc. One room is used as a laboratory in visual education. Several of the rooms used by the commercial department are equipped with business machines, exhibit cases, etc. There is an excellent health unit for the use of the health teacher, the school nurse, and the school physicians. There are four gymnasiums in two units—the partitions of which can be telescoped to make a single room of each unit, for use as a dance floor, for games, etc. The library, which occupies a considerable part of the third floor in the front of the building, is an unusually beautiful room, with a special workshop for the librarian. There are three lunch rooms, available for use separately, or as study halls. The excellent kitchen facilities are under the general charge of the Newark High School Alumnae Association, which provides luncheons on a non-profit basis for the children of the school.

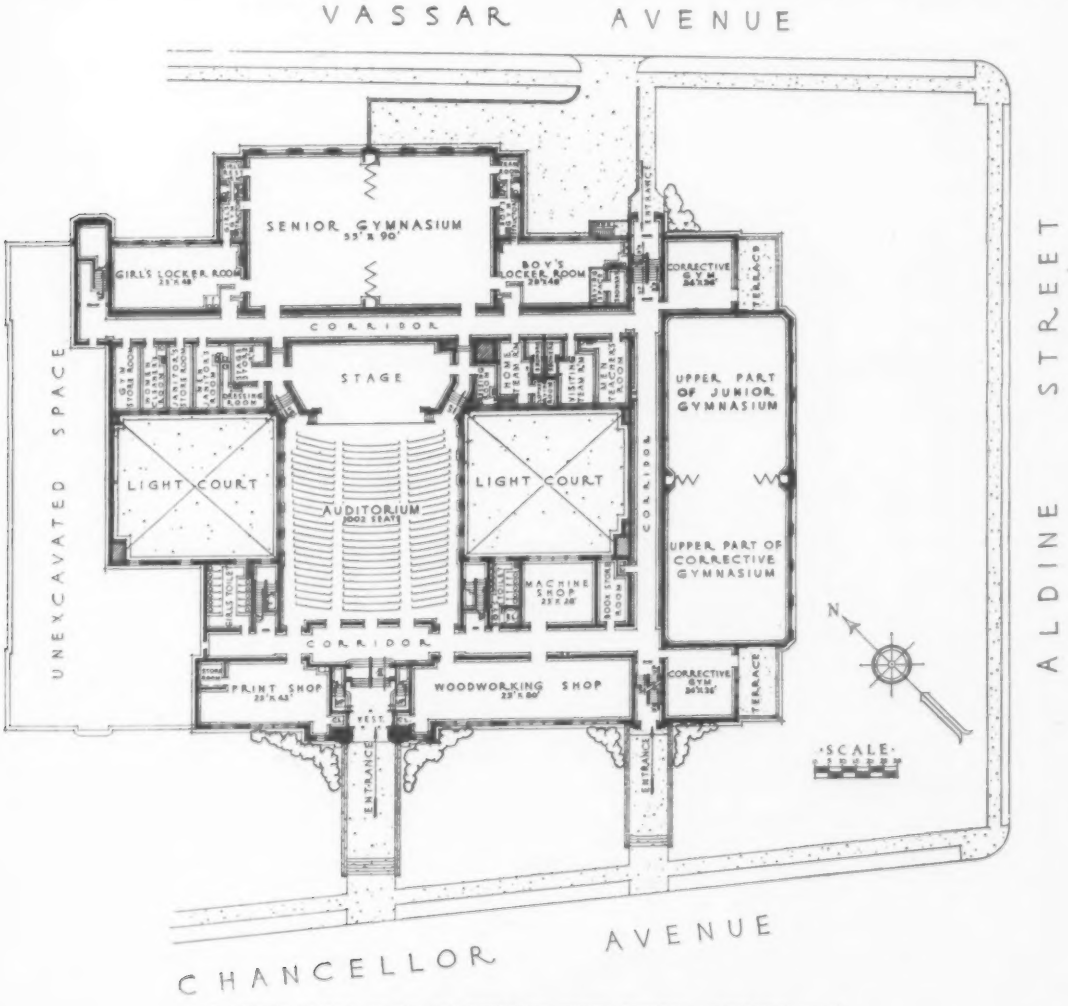
There are six toilets for boys and six for girls distributed over the several floors and ventilated by exhaust fans. Twelve washstands are also provided. There are 36 drinking fountains in the building. Along the corridors 1,701 lockers have been built into the walls, each locker with its own combination. Additional lockers are provided in the gymnasiums for use during physical instruction periods. These lockers are in special rooms, with lavatory and shower-bath equipment. Two special rooms are provided for the use of the home and the visiting teams during games.

Light—Heating—Ventilation

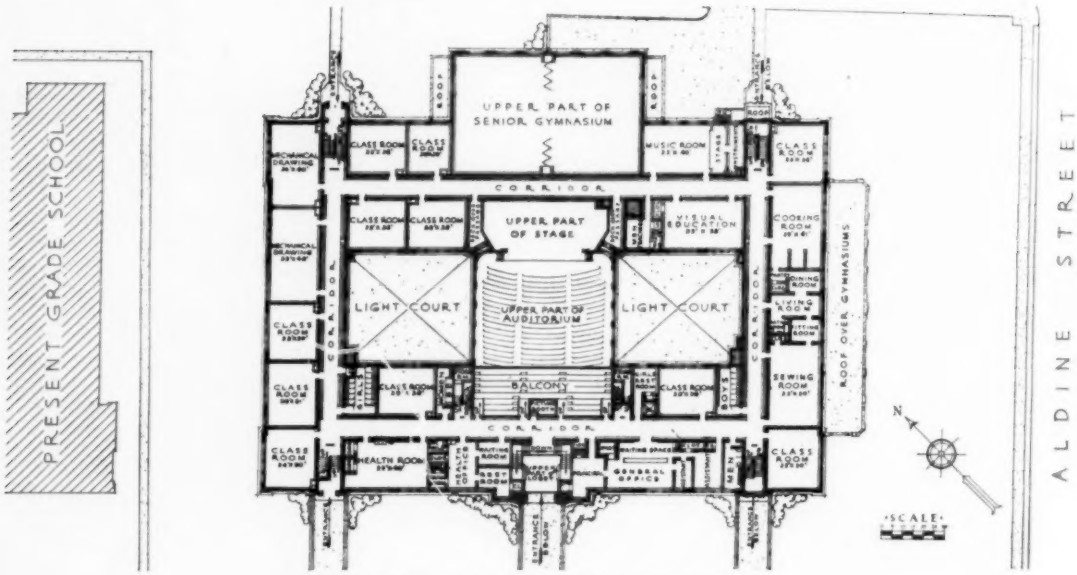
The classroom ceilings are of plaster on reinforced concrete and are fire-resistive. The doors, containing transparent glass panels and opening outward, can all be opened from within even when locked from without. The light comes from the pupils' left, and the amount of window space in relation to floor area averages about 23 per cent. The shades are translucent and of good quality. There is single seating throughout; in some rooms the chairs are of the movable type. On the average, there are 18 square feet per seat. Automatic ventilation is provided. Electricity is used for lighting in all the rooms.

The building is heated by steam which is generated by three locomotive type boilers in coal furnaces. Last winter the heating system used between 425 and 450 tons of rice coal. In the biological workroom and in one or two places elsewhere special provision has been made for heating a limited area at times when the building is otherwise not in use.

The vacuum cleaning system employs a 25-horsepower motor. To expel the foul air from the building there are seven exhaust fans on the roof, with remote control from the janitor's room. The auditorium and the gymnasiums are ventilated by two fresh-air intakes operated by two 5-horsepower motors located in the basement. The school has an incinerator system, with the main



GROUND FLOOR PLAN, WEEQUAHIC HIGH SCHOOL, NEWARK, N. J.

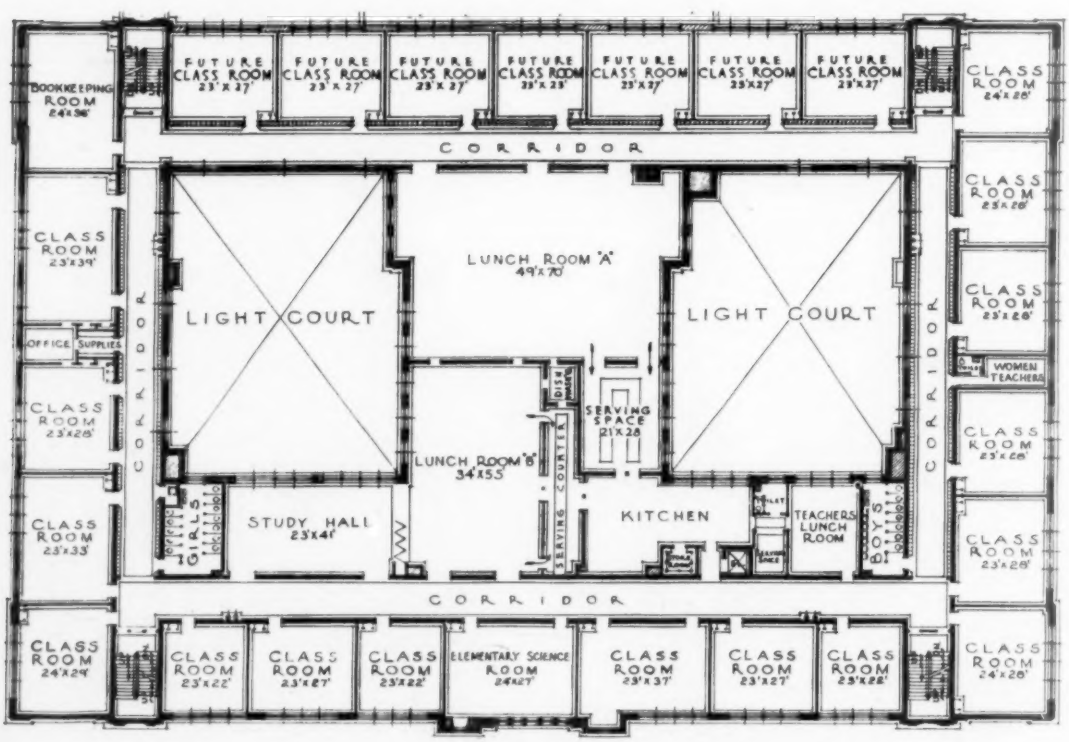


FIRST FLOOR PLAN, WEEQUAHIC HIGH SCHOOL

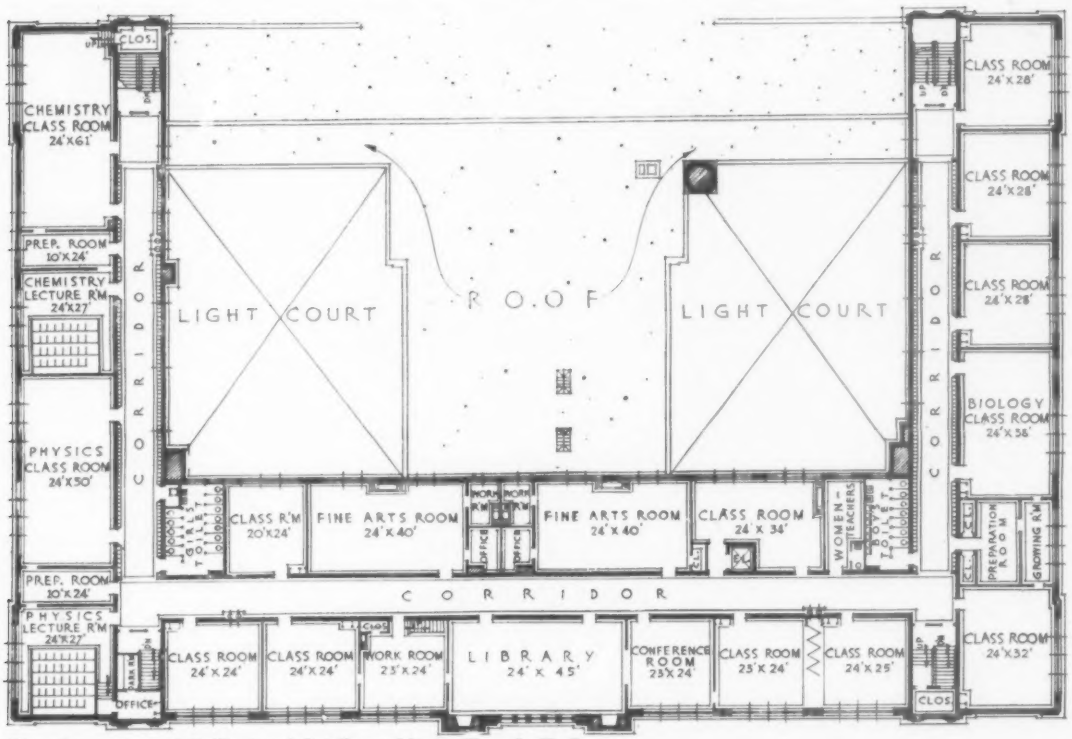
burner in the basement and hoppers on each floor. An emergency lighting system for the auditorium, corridors, etc., operates automatically if the outside current fails. This is provided by a system of storage batteries which are automatically kept charged.

Enrolment and Curricula

During the term beginning September, 1933, the school had approximately 2,100 students, using this building and six rooms in the elementary school. During the term beginning February, 1934, the



SECOND FLOOR PLAN



Plans by courtesy of Guilbert and Betelle, architects, Newark, N. J.

SECOND FLOOR PLAN, WEEQUAHIC HIGH SCHOOL

school had approximately 2,000 students, with four rooms in the adjoining building in use. The September, 1934, term started with an enrolment of 2,150. To deal with this number of students we have seventy-one teachers (including the principal, his assistant, and the librarian), two laboratory assistants, a pianist, and three clerks. A class of one hundred was graduated last June.

The school has been operated on a basis of seven periods, with the fifth or luncheon period divided into three sections, so that students might be properly accommodated in the lunch rooms. Each section is half an hour in length, and students recite or study during the two sections when they are not in the lunch rooms.

The following curricula are in operation in the school: General, College Preparatory, and Commercial (including both the business and the secretarial courses). For the time being, the pupil distribution is irregular. There are proportionately fewer pupils in the upper grades and more in the lower grades than will be the case later on. The curricula are liberal and well-balanced, including besides the constant subjects, music, art, shopwork, mechanical drawing, home economics, health instruction, etc. Scheduling of pupils is done in such a way that there is opportunity for individual conferences before important decisions are made. Classes have been organized so that there is an opportunity for guidance, and special provision has been made for advising students who expect to go to college. For the benefit of those who enter in February and who desire to graduate in three and a half years, so that a year may be saved in going to college, courses are properly arranged in a fashion that imposes the least possible burden in the necessary doubling of work.

Other Activities

A full program of extra-curricular activities has been in operation since the opening of the school, as a result of the generosity of the teachers in giving their time outside school hours. The control of such activities lies with the General Organization, to which the majority of students belong, at a term fee of 25 cents.

Many school clubs form part of the extra-curricular activities. These clubs meet once or twice a month. Some of the activities are as follows: Aquarium Club, Boxing Club, Camera Club, Craftsmen Club, Creative Art and Writing Club, Dance Club, Dramatic Club, Football Club, French Academy, Jr., French Club, General Organization, German Club, The Gift Shop, Girls' Golf Club, Girls' Swimming Club, Home Economics Club, Honor Society, Library Guild, Sanitation Squad, Service Orchestra, Social Service Club, Literary Club, Boys' Swimming Club, Symphonic and Military Band, Symphony Orchestra, Table Tennis Club, Tennis Club, Typing Club, Weequahic High School Choir, Wrestling Society.

The New TVA School at Norris, Tennessee

BY EARLE S. DRAPER

DIRECTOR OF LAND PLANNING AND HOUSING, TENNESSEE VALLEY AUTHORITY

THE public school of the Tennessee Valley Authority's new town of Norris has been planned to serve both school and community needs. Frills have been avoided in both construction and equipment, but every essential for the operation of an efficient modern school has been provided. It is expected to be completed and occupied early in 1935.

The school forms the central feature of a group of civic buildings, which are to be built later around an open square facing a wide town common. The almost severely plain façade of the school will act as a foil or background for the rather picturesque early American treatment of the other buildings of the proposed group.

The Sloping Site

Owing to the nature of the terrain, the site of the school is at a higher elevation than the other buildings. Thus, the square has much of the attractive effect of a sunken garden, with the school and playfield occupying a high terrace across one end. The slope of the ground is reflected in the design of the school, with the result that the front of the building is two stories in height while the rear is but one story. This treatment not only results in a building which seems fitted or molded to its site, but also adds the unusual safety factor of direct exits to the ground from each floor level without the necessity of using the main stairways. There are four corridor-connected grade-line exits from the first story, and four stairways and four grade-line exits from the upper floor, with additional grade-line exits from two of the stair platforms.

So far as possible, the school has been planned as two separate but homogeneous units; with a centrally located administrative department and the auditorium-gymnasium separating the high school from the elementary grades. Extending beyond the school, at the rear, is the athletic field. Adjacent to the kindergarten, play space is reserved for the smaller children. The athletic field has been laid out with provision for track and field meets, and football and baseball games. The use of the recreational area is not restricted to the students of the school, but is available for the outdoor group activities and field sports of the whole community.

The school building is 250 feet wide and has an extreme depth of more than a hundred feet. Provision has been made for 200 high school students—including the seventh and eighth grades—in seven classrooms; 225 elementary school pupils in six classrooms, and 45 children in the kindergarten. These figures are based upon the requirements for a population of 350 families in the town of Norris. The final plans of the building were developed by Charles I. Barber, Chief of the architectural section of the TVA Land Planning and Housing Division, assisted by various competent advisors.

The Materials of Construction

The wall construction, including all interior partitions, is of brick. The first-story floor construction consists of waterproofed concrete slabs resting on tamped earth and finished with wooden floors in the rooms. Second-story floors are of slow-burning construction with wooden joists protected by metal-lath and plaster. Critical points, such as the transformer room, etc., have ceiling slabs of reinforced concrete. Except for ceilings, no plaster is used on interior surfaces; the exposed walls are finished by painting directly upon the brickwork. The roof trusses are of steel, and the roofs are of sheet metal, painted to harmonize with the surroundings.

PLANS OF FIRST FLOOR (ABOVE) AND SECOND FLOOR OF THE TVA SCHOOL AT NORRIS

The Auditorium

The auditorium has been arranged so that it forms a link as well as a separation between the high school and the elementary grade school. It is directly accessible from either department without disturbing classes in the other. Also, the auditorium may be entered from the outside without passing through any portion of the school. The auditorium has a seating capacity of 580. Storage space for folding chairs is provided under the bleachers, so that the floor may be readily cleared for gymnasium use. In the latter case, the bleachers provide seating space for some 400 spectators.

A fireproofed projection booth equipped for talking pictures is located high above the floor at the opposite end of the room from the stage. Grade-line emergency exits at the sides of the auditorium insure that the space may be readily cleared if the need should arise. The stage also has a direct means of egress to the outside. In addition to its use in connection with school activities, the auditorium will serve as a public hall for lectures and other group meetings, which are expected to play a large part in the community life of Norris.

Arrangement of Rooms

The library and study hall in the high school wing is well isolated yet convenient for use. This is an exceptionally well-lighted room, with a ceiling running high into the roof, and numerous windows in the side-walls insuring cross ventilation. A small conference room for use in preparing debates and other research work opens from the library, as does a workroom for unpacking and sorting books.

The administrative and medical offices are located in the central bay of the first story, adja-

cent to the main stair halls, and conveniently accessible from within and without the building.

The kindergarten is a self-contained unit with its own separate facilities specially adapted to small children. The room is spacious and lighted from three sides, and contains a wide fireplace and a sink and a drinking fountain within the room.

The music room has been placed in one corner of the first story, beneath the kindergarten, where perhaps it will be least objectionable during practice periods. A small stage for recitals has been provided, together with a dressing room which may be used for chair storage when such accommodation is desired.

Coat closets or wardrobes opening directly from the classrooms are provided for the elementary department, and individual lockers are installed in the high school corridors. Separate toilet facilities are provided for each of the two departments, thus segregating the age groups. The kindergarten and the first grade have individual toilet compartments opening directly from the rooms. The shower rooms are directly accessible from the playing field or the gymnasium as well as from the main corridors. If the need develops, a part of the dressing-room space under the auditorium stage may be converted into boys' shower rooms, one for each department; in which case the present boys' shower room will be given over to the younger girls.

It was not necessary to provide facilities for manual training and domestic science classes within the school building itself, as the unusually complete mechanical shops and home-economics demonstration house used by the TVA in its system of adult training are also available for use by the school. Thus, these departments of the school will enjoy the advantage of superinstruction under the guidance of a staff of men and women each of whom is a highly skilled specialist in the various trades and crafts in which training is offered, so that the youth of Norris will be offered the benefits of instruction in branches far beyond the scope of schools considerably larger in size.

This new TVA school will serve as a demonstration of the practical application of electrical heating to a building of comparatively large size. After a careful comparison of costs, covering equipment, depreciation, upkeep and attendance—TVA low rates for electricity compared with local costs of $5.00 per ton for coal, for instance—the use of electricity was found both practical and economical for heating this building.

Heating and Ventilating

The main heating system is of the plenum type, in which the air is humidified by means of an electrically generated steam-jet, and then, by means of a fan, blown through an electrical heating chamber consisting of a series of resistance coils. From the heating chamber, the warm air is led by means of ducts to the various room outlets throughout the building. After cooling, a considerable portion of the air is returned to the system and recirculated. As a sanitary precaution, the warm air for the toilets, however, is drawn from the corridors and exhausted to the outside atmosphere by means of fans. The required quantity of fresh air for the main system is drawn from a duct extending through the roof. Some of the smaller rooms, such as the offices, are heated by means of unit type electric radiators to avoid complicating the system. The entire system is semi-automatic with thermostatic control, so that the minimum of attention is required. In this respect this type of electrical heating offers a decided advantage over fuel-burning systems which involve the expense of attendance. The elimination of smoke and gas is also an advantage from the standpoints of health, economy and esthetics.

The entire hot water supply for the building is heated electrically. For this purpose immersion type heaters in tanks or boilers are employed.

The Norris school will be operated as a TVA enterprise but meets all state requirements—in fact, exceeds them. No tuition will be charged residents of Norris, for the school will be maintained by charges included in the rentals of the TVA-owned houses of the community.

Dr. Floyd W. Reeves, TVA Personnel and Social Service Director, and formerly Professor of Education of the University of Chicago, will act as counsellor for the school. J. D. Williams, graduate of the University of Kentucky, who has done graduate work at the University of Cincinnati and at Teachers College, Columbia University, New York, and for the past five years has served as principal of the Danville (Kentucky) High School, will head the staff of teachers at Norris. No drastic innovations in instruction are contemplated, but each teacher has been selected on a basis of experience, alertness and enthusiasm for educational work.

Credit is due J. B. Calhoun, of the Tennessee State Department of Education, for his participation in working out the arrangement of the Norris school.

WESTINGHOUSE ELECTRIC AND MFG. CO.

EAST PITTSBURGH, PA.

Sales Offices and Locations in more than 110 Cities throughout the United States

CHAIN SUSPENSION TYPE SOLLUX WITH PANELED HANGER AND DECORATED GLOBE

CEILING TYPE SOLLAIRE WITH PLAIN SAFETY HANGER AND DECORATED GLOBE

SEMI-RIGID SUSPENSION TYPE LUNALUX WITH PANELED HANGER AND PLAIN GLOBE

CEILING TYPE SOLLITE WITH BANDED GLOBE

CHAIN SUSPENSION TYPE LUNAIRE WITH PANELED BRONZE SAFETY HANGER AND DECORATED GLOBE

The **Magnalux,** a semi-indirect luminaire, provides the highest quality of illumination with no glare and an efficiency of over 90 per cent. The low intensity illumination of Magnalux basins approaches that of the ceiling, causing them to blend into the light from above. To clean, simply disconnect one chain and wipe out the basin.

The **Sollux,** a luminaire using diffusing glassware, has a very high quality of illumination. The globe contour utilizes the highest percentage of the light generated. A keeper ring supports the globe in the hanger making it totally enclosed and dustproof. No setscrews to break globes. Tilt-out cap permits easy replacement of the lamp without removing the globe from its holder.

The **Lunalux,** a totally enclosed, semi-indirect luminaire, is a development which embodies the desirable features found in the Sollux design. The newly developed process of making this type of semi-indirect homogeneous glass creates a white reflecting surface on the inside of the lower part of the globe and leaves the upper part a light density having high transmission qualities with only slight diffusion.

SEMI-RIGID SUSPENSION TYPE MAGNALUX WITH PLAIN HANGER AND RING RELIEF BASIN

The **Sollaire** uses the diffusing type glassware and has practically the same efficiency of light distribution as the Sollux, which it resembles greatly in appearance.

Certain Sollux features have been eliminated in the Sollaire and a considerable reduction in cost has thus been made possible.

The **Lunaire** is a totally enclosed semi-indirect luminaire and is similar in characteristics to the Lunalux. Like the Sollaire, certain features found in the Lunalux unit have been eliminated and a considerable reduction in cost has thus been made possible.

The **Sollite** of diffusing glass offers a more angular globe. The diffusing glass used in the globe is of the same efficiency and quality as that used in Sollux and Sollaire Luminaires.

The simplified mechanical construction allows it to be offered at a lower price and the lock tight globe holder furnishes a quicker means of attaching and removing the globe.

INDUSTRIAL REFLECTORS AND SOCKETS

Bayonet Heel Glassteel Diffuser—For the best illumination obtainable for shops, gymnasium and similar purposes the Glassteel Diffuser should be used. It furnishes soft diffused illumination without glare. The Glassteel Diffuser consists of a diffusing glass globe and a white porcelain enameled reflector which directs most of the light downward. The reflector is furnished with a bayonet heel extension for attaching to the well-known "Easy-to-wire" Bayonet Socket.

Bayonet Heel RLM Dome Reflector and Socket—For general lighting effectiveness, the RLM Dome Reflector cannot be surpassed. Upward light, most of which would be wasted without reflectors, is reflected down toward the working plane and thus becomes of value. When mounted properly and equipped with the correct size lamps, no glare is apparent unless one looks directly at the lamp. Westinghouse RLM Dome Reflectors are also furnished with bayonet heel extensions.

Bayonet Heel Deep Bowl Reflector and Socket—This reflector provides an intensified light upon the working plane immediately beneath it and for that reason is ideal where the requirements are such that strong local lighting must be provided.

Bayonet Heel Symmetrical Angle Reflector and Socket—The Symmetrical Angle Reflector is made for installations where lighting must be done from the side, as the greater part of the light generated by the lamp is reflected into the vertical plane. At the same time the light strikes this plane at such an angle as to minimize reflected glare. These reflectors are for use with the Bayonet Socket.

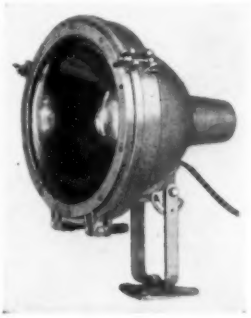
Vapor Proof Dome Reflector, Globe and Hood—Vapor Proof Reflectors and Hoods are sturdy, heavy-weight units and are gas, vapor and weatherproof. Gases or vapors cannot enter the units from the surrounding atmosphere since the globe seats on a special gasket.

FLOODLIGHTS

The Westinghouse Company manufactures a complete line of floodlighting equipment, distinctive features of which are high efficiency, durable construction, simple design, low maintenance, and long, dependable service.

Enclosed type floodlights are of cast silicon aluminum, spun aluminum, spun copper or sheet steel construction. The units are dust-proof and weatherproof, careful design insuring adequate cooling by radiation alone.

The reflectors used on all but small portable units are silvered glass or chromium plate, both of which are very resistant to abrasion and easily cleaned. Small portable units have highly efficient durable porcelain enameled reflecting surfaces. The lenses used on all types are of high quality heat resisting glass and may be of the plain, stippled or rectilinear spread type.



Lamp focusing on all but small portable units is easily accomplished by merely adjusting external thumb screws. All floodlights are provided with mounting brackets or bases which permit of universal adjustment.

Westinghouse enclosed type floodlights economically serve countless applications. They are used to floodlight buildings, monuments, athletic fields, industrial yards, or any area, large or small, where accurately projected and efficiently maintained light is desired.

Open Type floodlights are made of heavy sheet steel shaped to utilize the maximum output of the lamp. They are coated inside and out with porcelain enamel which is one of the best reflecting surfaces and is unequaled by any paint finish for its resistance to weather even under the intense heat from high wattage lamps. A variety of mounting brackets are available for use with these open type floodlights.

The open type floodlights are especially designed to fulfill requirements for an inexpensive yet efficient unit suitable for illumination of areas where a general broadcast of light is desired, such as athletic fields, playgrounds, service stations, parking lots, etc.

Aqualux or **Underwater** floodlights possess the same features of simple design, durable construction, and as rapid servicing as the other types of floodlights. All exposed metal parts are of non-ferrous material. The non-corrosive aluminum or bronze casings are positively water tight and enclose either highly efficient silvered glass or chromuim plate reflectors. The lenses are of the best quality heat resisting glass.

Aqualux units are used for any application requiring complete submergence of floodlights. When used in swimming pools, these units contribute materially to the safety and pleasure of bathers. In fountain illumination, the striking color effects obtainable with aqualux floodlights greatly enhance the beauty of the display.

GAS-ELECTRIC SETS

Westinghouse Gas-Electric Sets, from 800 watts to 75-kw. either a-c. or d-c., make possible an unfailing source of power supply, either by providing the normal source of supply continuously, or as an emergency standby for the normal source of supply whether it is individual plant or central station service. Either type of service may be supplied automatic or non-automatic.

These gas-electric sets are so designed and constructed that they may be used for either stationary or portable applications.

Automatic gas-electric sets may be supplied for operation with gasoline, natural or artificial gas as standard. Non-automatic sets also may be supplied for operation with kerosene for special applications. All sets operating on artificial or natural gas of a quality less than 700 BTU's per cubic foot must be derated 10 per cent.

These powerful, sturdy, engine generator sets are designed and built by experts in the design and construction of automatic control devices, and every possible feature is incorporated to insure reliable, unfailing service. Each part of the set, including engine, generator, exciter and starting battery, is designed for economy in maintenance as well as high efficiency.

MICARTA TRAYS

For Cafeterias and Laboratories

These trays are quiet, light in weight, easily kept hygienically clean and therefore are exceptionally well suited for use in school and college cafeterias and restaurants.

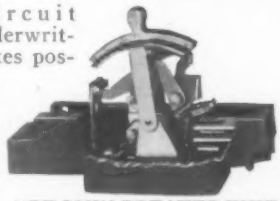
MICARTA TRAY

Also because alcohol, moisture, most acids and alkalis have no effect on Micarta trays, they are used in laboratory work where ordinary trays prove unsatisfactory.

Micarta trays have a smooth satin finish that time and use will not mar. Made in straight grain or burl walnut, curly maple, black and in fancy decorative designs: 9½ x 12½ in., 10¾ x 13⅞ in., 13⅝ x 17⅝ in., 15⅜ x 20¾ in., 16½ x 22½ in.

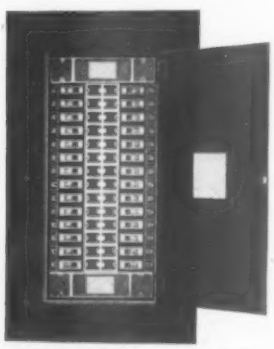
FUSELESS PROTECTION

The "De-ion" circuit breaker unit has Underwriter's approval and makes possible fuseless circuits of 15 to 600 amperes, 125, 250, or 600 volts for buildings. This unit with modifications is used in meter Entrance Breakers, Nofuze Panelboards, Nofuze Power Distribution Panelboard, on switchboards, in a cabinet as a safety switch; instead of switches and fuses and in Load Centers where a small number of circuits are required. Thus it is possible to have complete fuseless protection from point of entry to final location.



"DE-ION" BREAKER UNIT

Convenient, safe and tamper-proof, no fuses to replace, tripped breaker quickly detected because of handle position, and easily reclosed, are important advantages. Additional advantages are:



NOFUZE PANELBOARD

1. Can be reclosed by anyone as easily as a switch. Safe, nothing to replace or to renew.
2. Time lag prevents unnecessary tripping on slight, momentary overloads.
3. Cannot be held closed against an abnormal overload or short circuit.
4. Cannot be blocked to prevent its opening the circuit.
5. Rating cannot be changed by unauthorized persons.
6. Requires small mounting space.
7. Opens a short circuit without undue flash or noise.
8. No live parts accessible.

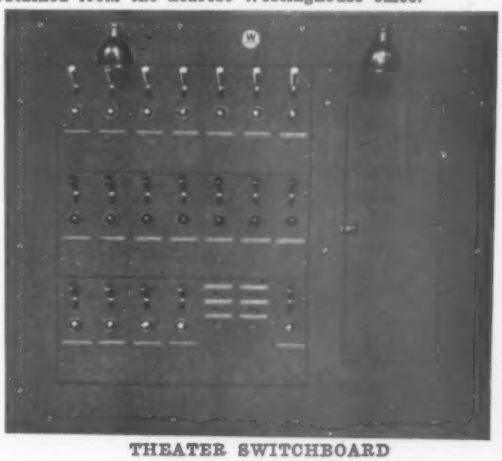
PANELBOARDS

Westinghouse manufactures a complete line of panelboards to meet all lighting control applications. Type NA1B Nofuze lighting and distribution panelboards are equipped with "De-ion" circuit-breakers in place of the conventional switches and fuses.

THEATER SWITCHBOARDS

Westinghouse builds seven types of theater switchboards to meet the varied needs for control of colored lighting effects. Light, properly controlled, can add much to the effectiveness of the play or act. The audience, under the influence of colored light, unconsciously absorbs the spirit behind the production.

Complete information on theater switchboards can be obtained from the nearest Westinghouse office.

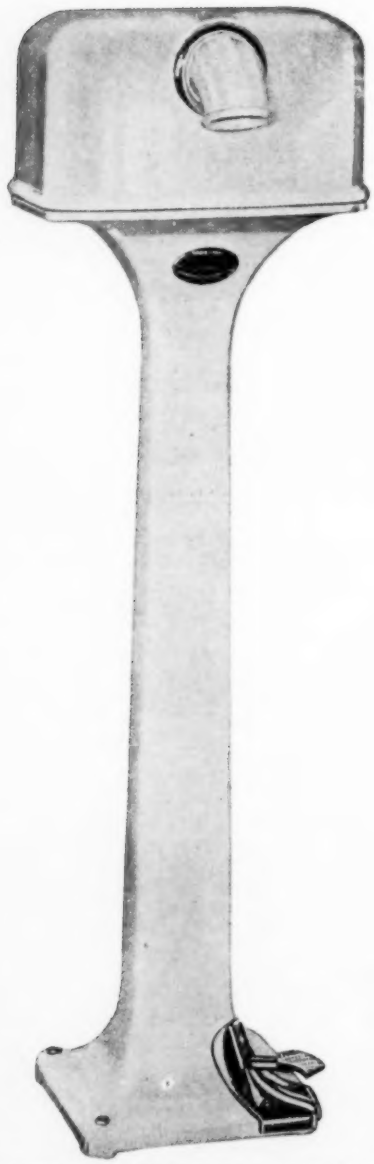


THEATER SWITCHBOARD

CHICAGO HARDWARE FOUNDRY CO.

ELECTRICAL DIVISION

North Chicago, Illinois

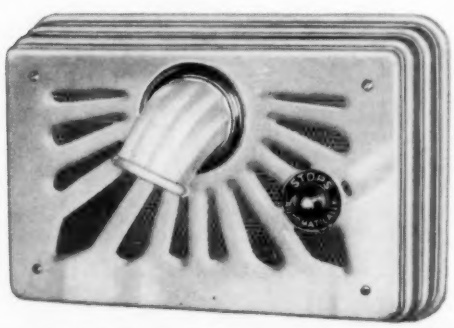


The new "SF" model SANI-DRI, standard in white or colored vitreous enamel and powered with a standard, universal type ⅛ H.P. motor. The full-turn swivel nozzle is adjustable to any position for drying hands or face as desired

"WASHROOM CONTROL"
with
SANI-DRI ELECTRIC DRIER

The function of SANI-DRI is to furnish a continuously dependable, sanitary drying service. But SANI-DRI does more than that—it provides what users term "washroom control". Drying service cost, washroom cleanliness, janitorial expense are *automatically* controlled where SANI-DRI is installed. Users report that invariably complete installations of SANI-DRI result instantly in cleaner washrooms because of the disappearance of towel-litter; reduced janitorial requirement because there is no necessity of filling towel-cabinets or clearing out soiled-towel receptacles. Towel-bill savings of 60% to 90% soon write off the moderate cost of SANI-DRI and these savings continue year after year.

Your inquiry relative to the application of SANI-DRI to the solution of your washroom problem will receive our prompt attention.



The new "RW-F" model for semi-recessed installation for new construction, is supplied with either foot-pedal control or, as here illustrated, with push-button control and automatic cut-off

These Pictures Tell the Story of Complete "WASHROOM CONTROL"

Photographs of a typical washroom showing condition before and after installing SANI-DRI

ABOVE: The washroom before installing SANI-DRI — untidy, soiled-towel receptacles awaiting emptying, towels littering the floor

BELOW: The same washroom after installing SANI-DRI—neat, no soiled-towel receptacles, no towels littering the floor—*automatic washroom control*

CONGOLEUM-NAIRN INC.

General Office: Kearny, New Jersey

SEALEX *Linoleum Floors* *and* **SEALEX** *Wall-Covering*

Many of America's best known colleges and universities are among the thousands of schools that have installed Sealex Linoleum Floors. Developed by Congoleum-Nairn, the world's largest manufacturer of smooth-surface floor-coverings, Sealex possesses desirable qualities that make it a first choice in the school field.

To begin with, Sealex is resilient; therefore quiet and comfortable under foot.

Also, because its smooth surface contains no dirt-catching cracks or joints, Sealex may be kept clean and sanitary with little effort.

Furthermore, this floor is built to retain its freshness and color for many years without expensive refinishing. **Records show that during its long period of service, Sealex actually pays for itself in maintenance economies.**

There is a wide variety of Sealex Linoleum Floors appropriate for every type of school interior. And any floor design, ranging from color-

Younger children become more willing pupils in the classroom that's been made cheerful and attractive by a Sealex Linoleum Floor with colorful hand-cut insets. Above, one of the new Sealex Veltones serves as a background for nursery rhyme characters and letters of the alphabet in this designed-to-order floor.

LEFT: Resilient, noise-subduing floors of Sealex Treadlite Tile are a definite aid to concentration in the library of the Topeka Kansas High School.

ful, amusing insets for younger pupils' classrooms to classic or school emblems fitting for the finest university, may be cut-to-order at moderate cost in Sealex.

For all spaces where a distinctive ready-made flooring is required, or as a background for specially cut insets, Sealex Veltone Linoleum is recommended. Veltones combine linoleum's practical advantages and economy with a unique decorative beauty which has won these floors a place in the most luxuriously designed interiors.

Another material widely installed in schools throughout the country is the new linoleum-type Sealex Wall-Covering. Available in a wide selection of colorings, Sealex Wall Covering is permanent, easily maintained and never has to be "gone over."

Sealex Linoleum and Wall-Covering are equally suitable for remodeling purposes or for completing new school interiors. When installed by authorized contractors of Bonded Floors or Bonded Walls, both materials and workmanship are backed by Guaranty Bonds. For further information write:

CONGOLEUM-NAIRN INC.
KEARNY, NEW JERSEY

Obtainable in a variety of attractive two-toned colorings, Sealex Jaspé Linoleum is cheerful and decorative without any sacrifice of practical advantages.

The modern splinter-proof gymnasium floor — Sealex Linoleum with inlaid game markers of contrasting colored linoleum. West Milwaukee High School, Wis.

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International Time Recording Division

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Complete information regarding any one or all the following International devices may be obtained by writing or telephoning the nearest branch office

ELECTRIC TIME AND PROGRAM SYSTEMS

Metal Case Secondary Clock

International manufactures hundreds of different types of time recording, indicating and signaling devices. Most of these are furnished for operation either individually or as secondary units in a master clock controlled system. In the latter case, any building or group of buildings is furnished with a completely automatic and dependable electric time service.

Master Clock

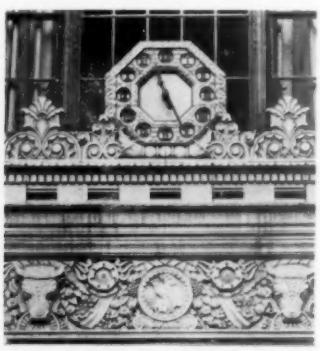
Marble Dial Secondary Clock

The International Self-Regulating Electric Time System features the highest advancement made to date in time system engineering — automatic, electric supervision. Once each hour all units are simultaneously checked or aligned for continuous agreement with their master time source. Attendance time recorders, wall clocks, job time recorders and time stamps operate in exact unison.

A Typical Tower Clock Built to Specifications

Clocks and bells cannot contradict each other when International Program equipment is operated as part of this time system. Classes are moved and periods are designated exactly on schedule.

All International equipment is furnished in designs and styles to meet any architecture or decorative requirement.



A Typical Outside Clock Designed to Conform with Architect's Plan

THE AMERICAN SCHOOL AND UNIVERSITY

INTER-ROOM TELEPHONE SYSTEMS

Cradle Type Telephone

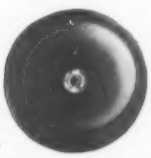
Many types of International telephone systems are available for inter-schoolroom use, including various models of switchboard, push button board and automatic dial systems. Data sheets are furnished on request.

Desk Type Telephone Switchboard

Flush Wall Telephone

All equipment is specially designed for the greatest convenience and ruggedly constructed to furnish the highest quality service at minimum cost. Operation of all types is extremely simple.

FIRE ALARM SYSTEMS



Fire Alarm Gong

International Fire Alarm Systems offer the most up-to-date equipment for the protection of life and property. Systems for any requirement built to specification.

Fire Alarm Control Panel

Break Glass Station

Only the latest engineering features and approved circuits are included in each installation. The entire line has been approved by the National Board of Fire Underwriters.

CENTRAL CONTROL RADIO, MUSIC AND SPEECH SYSTEMS

Wall Type Radio Loudspeaker

For amplifying and distributing radio, phonograph or microphone programs, International provides an unusual Central Control Radio, Music and Speech System. All the control instruments are contained in one cabinet type panel which is as easily operated as the ordinary home type radio.

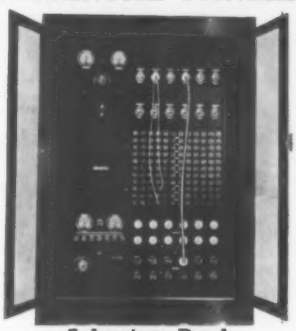
Two Channel Sound Control Cabinet

Clock and Loudspeaker in One Unit

A sectional plan of construction permits this equipment to be purchased as needed or as funds become available. Specially designed loudspeakers assure faithful, lifelike reproduction and are furnished in models for all indoor and outdoor uses.

LABORATORY EXPERIMENTAL PANELS AND ACCESSORIES

International Laboratory Panels make any number or combination of both A. C. and D. C. voltages available for experimental work. Furnished in sections, these panels may be supplemented as desired. Protective features have been incorporated to eliminate any possibility of danger. Equipment for any particular need will be built to specification.



Laboratory Panel

The International line also includes many specialties and accessory devices, including: Nurses' call systems; Doctors' paging systems; Watchmen's clocks; Recording door locks; Time switches; Chimes, etc.

Representatives in any of the International offices will gladly cooperate in furnishing more complete information and specification details.

INTERSTATE SHADE CLOTH CO.

Hoboken, New Jersey

THE LAPSLEY-INTERSTATE SHADE CLOTH CO., Baltimore, Maryland

Two Shade Cloths Especially Recommended for School Window Shades

Interstate TRADE MARK

SUNLITE CAMBRIC

(Light without Glare)

Interstate TRADE MARK

INTER-TWILL *

(The Twill Woven Fabric)

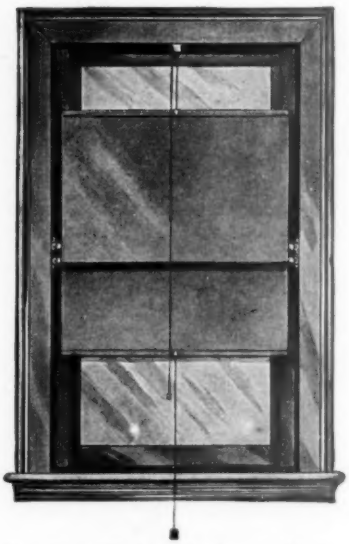
There are certain requirements for shade cloth for school use which should be standard:

1. A school shade should be sturdy and long-wearing, made of a material tested for tensile strength.
2. It should be of fast color.
3. It should be easily cleanable.

Interstate Sunlite Cambric and **Interstate Inter-Twill** live up to these requirements in every respect.

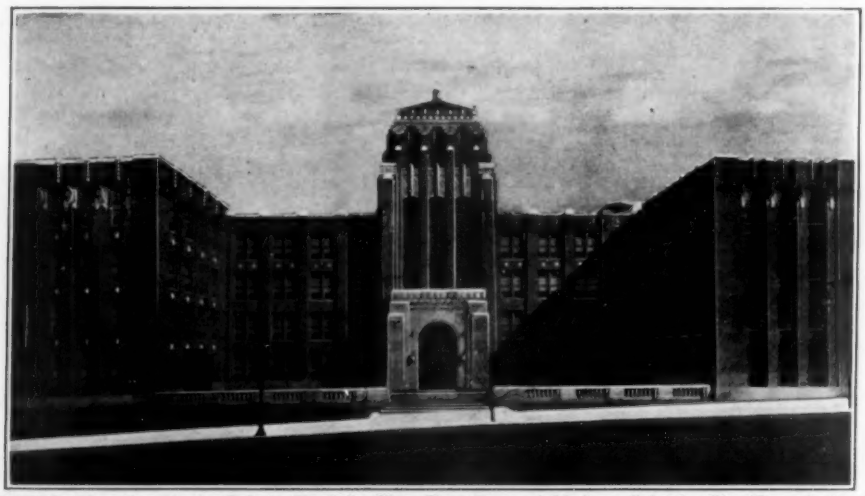
That well-known slogan of the National Clean-up and Paint-up Campaign Bureau, **"Save the surface and you save all,"** is equally true for shade cloth. Since the cause of window shade deterioration is the scorching effect of the sun's rays, the best way to protect the shade cloth is to paint the surface with pure linseed oil pigment, applied by hand. Both the **Sunlite Cambric** and the **Inter-Twill** are painted in this way, so as to produce not only a long-wearing, non-fading shade, but one that is also as easily and successfully cleaned as any painted surface.

* Sunlite and Inter-Twill are painted by hand. Cleanable and Will Not Fade.



Use Two Window Shades as Above, for Better Ventilation and Light Control in the Classroom

The two shades are installed at the center of the window. One may be pulled up to cover the upper sash, the other shade pulled down to cover the lower sash



INTER-TWILL Was the Shade Fabric Used in This Fine Type of Modern School—The Newark, N. J., School of Fine and Industrial Arts

The illustrations below show the chief steps in the hand-painting process, using oil pigment—conceded by all to be the best method for lasting results.

First the cloth is glued on the frame. Next, a high-grade glue size is applied. Then the cloth is stretched by hand. The following day, the shade is hand-painted—one coat to each side except in the case of No-Lite, which receives three coats. If desired, a different color can be used on each side.

The hand-stretching is important, because it means a painstaking job of framing out the full width of the cloth, removing all fullness and preventing curling and bagging of the finished shade.

Interstate Sunlite Cambric

Interstate Sunlite Cambric is a hand tinted shade cloth made on unfilled cambric. This cambric has a thread count of 72 x 80, and exceeds government specifications for thread count and tensile strength. In the lighter tints, it is translucent (light without glare), and in the darker colors, it is semitranslucent.

Interstate Inter-Twill

Interstate Inter-Twill is an improved type of shade cloth with the strength in the twill. This is the strongest and toughest of all our shade cloths—and **all** of them are sturdy and long-wearing and will stand rough usage!

Widths

Sunlite Cambric is made in widths up to 150 inches; **Inter-Twill,** in widths up to 130 inches.

Colors

Both shade materials are procurable in any color tone, in either solid color or duplex colors as desired.

Rollers

Interstate "Rolrite" Wood Rollers live up to their name: They "roll right" because they are made with a specially constructed spring of highly tempered steel wire. Every "Rolrite" is unqualifiedly guaranteed.

"Rolrite" Rollers are made in four diameters: $1\frac{5}{16}$", 1", $1\frac{1}{8}$" and $1\frac{1}{4}$". (For shades wider than 63", specify metal rollers. These are made in eight diameters: 1", $1\frac{1}{4}$", $1\frac{1}{2}$", $1\frac{3}{4}$", $2\frac{1}{4}$", 3", 4" and 5".)

Slats are $\frac{7}{8}$, $1\frac{1}{4}$, $1\frac{1}{2}$, $1\frac{3}{4}$, 2 and $2\frac{1}{2}$ in. For shades up to 60 in. wide not less than $1\frac{1}{4}$-in. slat should be used.

We recommend the following diameters: for shades up to 38 in., 1 in.; shades 39 to 48 in., $1\frac{1}{8}$ in.; shades 49 to 63 in., $1\frac{1}{4}$ in. For shades wider than 63 in., use metal rollers.

For wear, service and economy, specify always **"Interstate"** products through your local dealer.

We also manufacture Silver Screens for moving pictures and Lite-Proof Shades for darkening auditoriums, in widths up to 150 inches.

Applying the Color One Coat on Each Side

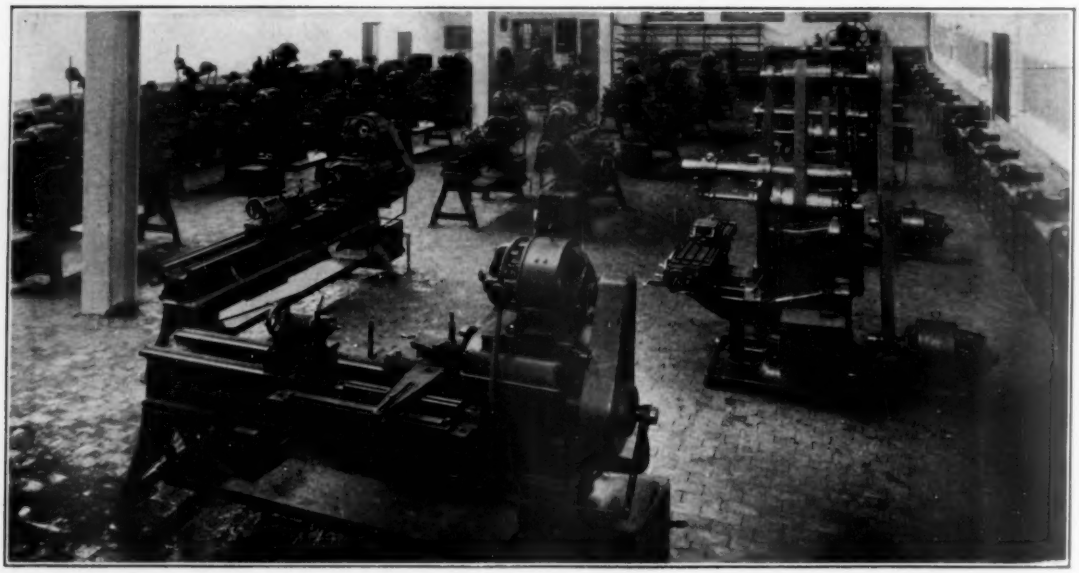
Blending the Color into the Fabric

Applying the Finishing Stroke

THE JENNISON-WRIGHT COMPANY

Toledo, Ohio

Branches in All Large Cities



Kreolite Wood Block Floors serve in the school and educational institution no less than in the factory and work shop where today their use is so general as to reveal Kreolite as the national choice for heavy-duty service.

Especially is Kreolite specified for all departments where mechanical operations are carried on. Tools are not damaged when they are dropped, for the Kreolite floor is resilient. The floor is not damaged because wear and accident leave no appreciable impression upon the tough end grain surface of the specially treated selected wood blocks.

Among the scores of leading educational institutions now enjoying the economy and benefit of Kreolite Wood Block Floors are: Cleveland High School, Cleveland, Ohio; Jefferson High School, Los Angeles, Calif.; Lindbloom High School, Chicago, Ill.; University of Michigan, Ann Arbor, Mich.; Purdue University, Lafayette, Ind.; Technical School, Indianapolis, Ind.; University of Illinois, Urbana, Ill.; University of Wisconsin, Madison, Wisc.; Yale University, New Haven, Conn.

Write for complete information.

The value of Kreolite Flexible Strip End-Grain Wood Block Flooring is recognized instantly by the modern architect of schools and public buildings. Among the big new schools in which this ultra-modern floor is being laid this month is the Junior-Senior High School in Charles City shown above. Only Kreolite is appropriate in such a building.

Kreolite Flexible Strip End-Grain Wood Blocks cannot become loose. The durability is practically limitless as the strips are laid with the tough end-grain of the individual blocks uppermost. The light, natural color and beauty of the wood is retained, although the blocks are treated with a water-proof preservative.

Complete information sent on request

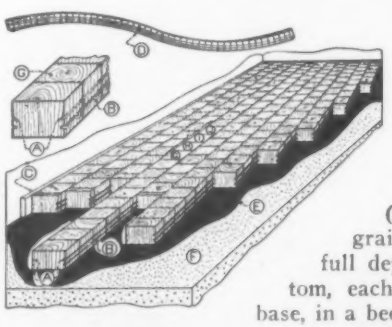
(a)—Metal sire truss binding the individual blocks into a compact, solid monolithic-like end-grain plank or strip.

(b)—Metal spline binding the individual strips together.

(c)—Cork expansion joint laid flush with the surface of the floor.

(d)—Flexibility—can be laid over wood sub-floor, in mill type buildings.

(e)—Waterproof membrane between concrete and strips.



(f)—Smooth finish concrete foundation.

(g)—Surface sanded smooth.

(h)—Manufactured from properly dried yellow pine or redwood.

(i)—Treated with a colorless, odorless, waterproofing preservative so that the natural light color of the wood is maintained.

(j)—Laid with the tough end-grain up. End-grain blocks run full depth of strips, from top to bottom, each block being anchored to the base, in a bed of mastic.

KREOLITE

FLEXIBLE STRIP WOOD BLOCK FLOORING

THE AMERICAN SCHOOL AND UNIVERSITY

KALMAN STEEL CORPORATION

SUBSIDIARY OF BETHLEHEM STEEL CORPORATION

General Offices Bethlehem, Pa.

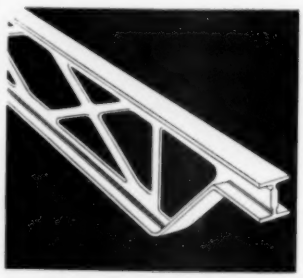
DISTRICT OFFICES

Albany, Atlanta, Baltimore, Boston, Buffalo, Chicago, Cleveland, Cincinnati, Detroit, Houston, Milwaukee, Minneapolis, New York, Philadelphia, Pittsburgh, St. Louis, St. Paul, Syracuse, Washington. **Pacific Coast Distributor:** Pacific Coast Steel Corporation, San Francisco, Los Angeles, Seattle, Portland, Honolulu. **Export Distributor:** Bethlehem Steel Export Corporation, New York

FIRE-SAFE BUILDINGS AT MODERATE COST

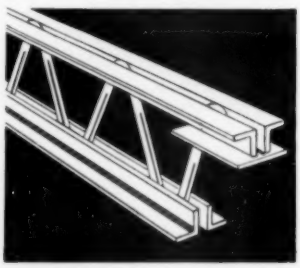
Kalman Steel Joists offer a method of constructing fire-safe buildings at moderate cost.

Kalman Floor Construction consists of Kalman Joists, rigidly bridged, concrete slab on metal lath, and plaster ceiling. Tests have proved this construction capable of safely resisting fire continuously for more than two hours.



KALMAN JOIST

In addition to fire-safety Kalman Floor Construction provides a non-shrinking floor structure that prevents the formation of cracks where the floor and walls meet, and keeps out cold air and vermin. Further this construction is immune to termites and other wood-devouring insects, and absorbs sound and vibration, preventing noises overhead from disturbing the classrooms below.



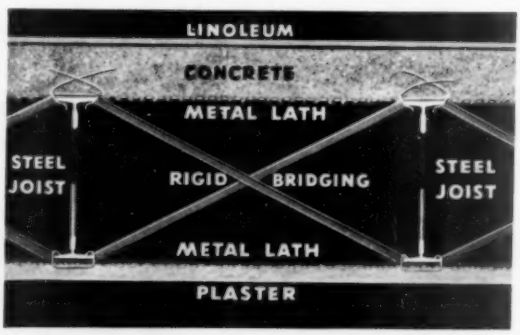
MAC MAR JOIST

With its fire-safety and other advantages, Kalman Floor Construction adds only slightly to building cost. Kalman Joists reach the job in the exact lengths required and are installed without cutting or fitting. Pipes and conduits are run through the open webs.

Any of the usual floor finishes may be used with Kalman Floor Construction.

Kalman manufactures two types of Steel Joists—Kalman Joists, one-piece steel trusses made from structural-grade new-billet steel, and Mac Mar Joists, steel trusses composed of angle chords and continuous bar web, assembled by pressure welding. Either type of joists offers fire-safe floor construction at moderate cost.

These joists are tried and proved products. They have been widely specified for occupancy buildings of all types, including many school and college buildings, representative examples of which are shown on the opposite page.



Kalman Fireproof Floor Construction consists of rigidly-bridged joists, concrete floor slab, and plaster ceiling. Any of the usual floor finishes may be used with this type of construction

REPRESENTATIVE SCHOOL AND COLLEGE BUILDINGS IN WHICH KALMAN FLOOR CONSTRUCTION WAS USED

Lindenhurst High School, Lindenhurst, Long Island, N. Y.
Louis Inglee, Architect—Zerbe Construction Co., Contractor

Administration Building, Wells College, Aurora, N. Y.
Dwight James Baum, Architect
Hegeman Harris Company, Contractor

San Fernando School, San Antonio, Texas
Leo M. J. Dielmann, Architect
Dielmann Construction Co., Contractor

Kennett Consolidated School, Kennett Square, Pa.
E. William Martin, Architect—William M. Francis Co., Contractor

Upper Darby Junior High School, Upper Darby, Pa.
Heacock and Hokanson, Architects—John McShain, Contractor

MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

2825 Fourth Avenue South
Minneapolis, Minnesota
Branch Offices or Distributors in All Principal Cities

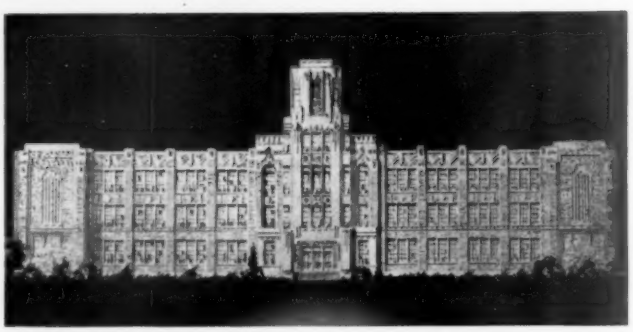
The MODUTROL SYSTEM *of* AUTOMATIC CONTROL

For Heating, Ventilating and Air Conditioning Systems

The Minneapolis-Honeywell Modutrol System meets every control problem, in old buildings or new, large or small, individually or in groups.

NATHAN HALE JUNIOR HIGH SCHOOL
West Allis, Wisconsin

The entire heating, ventilating and humidifying system in this school is automatically controlled. The direct radiation under Modustat control has capacity for handling sixty per cent of the maximum heat loss. The central fan ventilating system of the modified split type is designed to carry forty per cent of the maximum heating load. Dampers for individual room, mixing, by-pass, main intake and exhaust air as well as steam coil valves are controlled by modulating or two-position motors and thermostats. Thus the entire system performs as a unit to automatically provide the exact indoor atmosphere required at all times. Manual control switches are provided to allow remote manual operation of dampers when desired.



OPERATION

THE Modustat Control of individual radiators operates independently yet in perfect balance with the electrical control of ventilating dampers, temperature coils or steam valves, and enables each room or unit to be controlled independently of the remainder of the building. The accurate proportioning of cold, warm, fresh and re-circulated air—and truly modulated delivery of that air—avoids sudden changes in room control and consequent overheating and chilling.

THE MODUSTAT

A self-contained automatic room temperature control valve for direct or concealed radiation. Automatically proportions the steam supply to offset the heat losses from the space heated.

FLEXIBILITY

The Modutrol System is tailor made for every job and is flexible in application to any building. It completely meets the complicated problems presented by the ever-changing conditions of wind, solar radiation, outdoor temperatures and occupancy.

ECONOMY

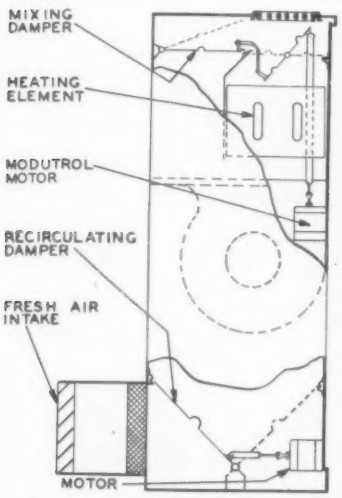
Initial Cost—As the cost of the Modutrol System is in direct proportion to the number of controls used, it is adaptable to small as well as large buildings.

Service Cost—Each thermostat or controller operates its valve or damper motor independent of all other parts of the system, therefore any unit may be inspected, adjusted, changed, or serviced, without affecting any other part of the system.

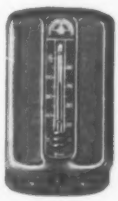
Maintenance Cost—The product of a half century of experience in the engineering and manufacturing of electrical controls insures the low maintenance cost that built the company's reputation.

Plant Operation—Continual accuracy in response to temperature changes and true modulation unimpaired by dampers or valves binding or sticking means that the amount of steam used

will be only the precise amount required to offset heat losses from the space controlled. The elimination of steam waste soon pays for the entire Modutrol System.



UNIT VENTILATOR CONTROL DIAGRAM



DAY-NITE TWIN THERMOSTAT

which automatically maintains desired temperature both during day and a lower temperature during period of inoccupancy.

ACCEPTANCE

Until the development of the Modutrol system it was not possible to accurately balance heat in-put with heat loss and thus derive the greatest measure of heating satisfaction and fuel economy from all types of heating systems. It was inevitable therefore that when the Modutrol System was developed it should be acclaimed and accepted by architects, engineers, school executives, building owners and managers, and by the entire heating industry.

The schools listed below are some of the typical Modutrol installations which range from the smallest school house to the mammoth Rockefeller Center in New York City:

North Aurora Grade School, Chicago, Ill.
Nathan Hale School, West Allis, Wisc.
Theodore Roosevelt High School, West Orange, N. J.
Roeliff Jansen School, Hillsdale, N. Y.
Eagle Lake School, Cromwell, Minn.
Harris School, Needham, Mass.
St. Mary's School, Port Chester, N. Y.
Felician Sisters' Convent, Buffalo, N. Y.
Villanova Gymnasium, Villanova College, Villanova, Pa.
Norwich Free Academy, Norwich, Conn.
Mt. Pleasant Elementary and Junior High School, Bellevue, Del.
Residence Park School, Dayton, Ohio
Ford and Manville Halls, St. Paul's School, Concord, N. H.
Mary E. Miller Vocational High School for Girls, Minneapolis, Minn.

SINCE 1885

For nearly half a century Minneapolis-Honeywell has pioneered the field of engineered automatic temperature control. Its 50 years of control experience have enabled it to constantly develop and produce precision control equipment for every purpose. The Modutrol System, its most important achievement, is typical of the half century of progress it has made.

A TYPICAL SMALL MODERNIZATION INSTALLATION THAT SAVED 32% IN FUEL

THE GLENWOOD PRIMARY SCHOOL, GLENWOOD, MINNESOTA

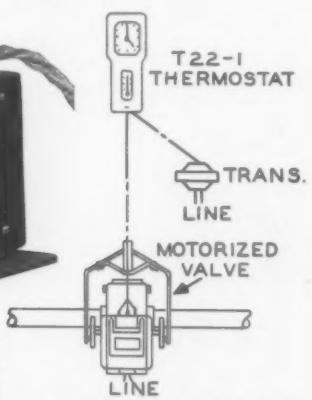
Erected in 1907. The Modutrol System, installed at a cost of $250, saved this school $133.25, or 32%, in the first three months, with outside temperature averaging 10° colder. The city of Glenwood has since added Modutrol Zone Control to this building and has equipped other buildings with the Modutrol System.

ENGINEERING SERVICE

The Minneapolis-Honeywell engineer in your city will gladly survey your plans or your present heating system and work with your heating engineer or architect without obligation. Our complete catalog is available upon request. Minneapolis-Honeywell Regulator Company, 2825 Fourth Avenue South, Minneapolis, Minn. Branch offices and distributors in all principal cities.

THE MODUTROL MOTOR

which operates dampers and louvers. It permits true modulation by maintaining itself in exactly the position required to balance the temperature of fresh or recirculated air with room temperature.



ZONE CONTROL DIAGRAM

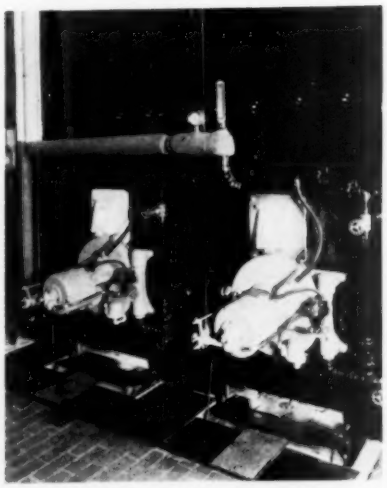
A single thermostat controlling operation of electric valve supplying heat to one building or a section of a building.

PETROLEUM HEAT AND POWER COMPANY

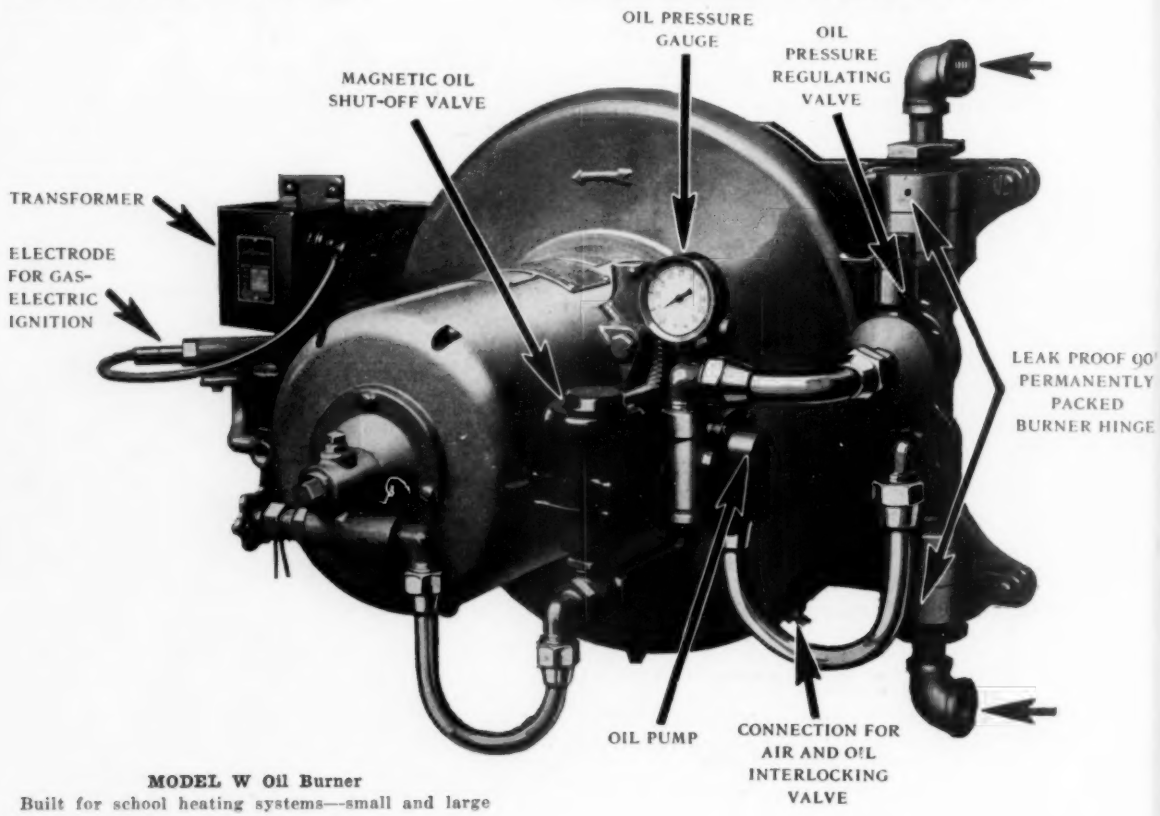
Stamford, Conn.

PETRO-NOKOL OIL BURNERS FOR SCHOOLS — LARGE AND SMALL

Are you considering the installation of a new heating system in any school or college building? If so, no doubt you have already given the matter some study and been impressed with the immense superiority of oil-burning equipment over coal-burning furnaces:—the increased operating efficiency of the oil burner, due to more perfect combustion; the increased fuel economy, with no ash loss; the increased capacity of the boiler—almost double, when oil is used instead of coal; the increased responsiveness of the oil-fired boiler (producing steam at the required pressure, in the required amounts, in double-quick time); the increased life of the boiler and brick work; the saving in space required for fuel storage; the elimination of coal handling and ash removal; the tremendous saving of janitors' time; the greater convenience in fuel delivery; and the elimination of the smoke nuisance.



Showing an Installation of the MODEL W Oil Burner


OIL PRESSURE GAUGE
OIL PRESSURE REGULATING VALVE
MAGNETIC OIL SHUT-OFF VALVE
TRANSFORMER
ELECTRODE FOR GAS-ELECTRIC IGNITION
LEAK PROOF 90° PERMANENTLY PACKED BURNER HINGE
OIL PUMP
CONNECTION FOR AIR AND OIL INTERLOCKING VALVE

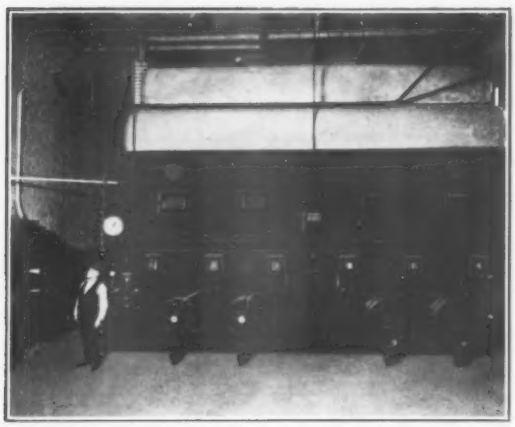
MODEL W Oil Burner
Built for school heating systems—small and large

THE AMERICAN SCHOOL AND UNIVERSITY

Having decided on oil-burning rather than coal-burning equipment, the next step is to choose the proper make and type of oil burner. Be sure to investigate the Petro-Nokol Oil Burner Systems, manufactured by the Petroleum Heat and

WORLD'S LARGEST OIL HEATING ORGANIZATION

Power Company, the world's largest oil heating organization. The experience of this company in making all types of good oil burners and in selling low-priced fuel oil to operate in these burners has resulted in placing oil heat on a new economic basis.



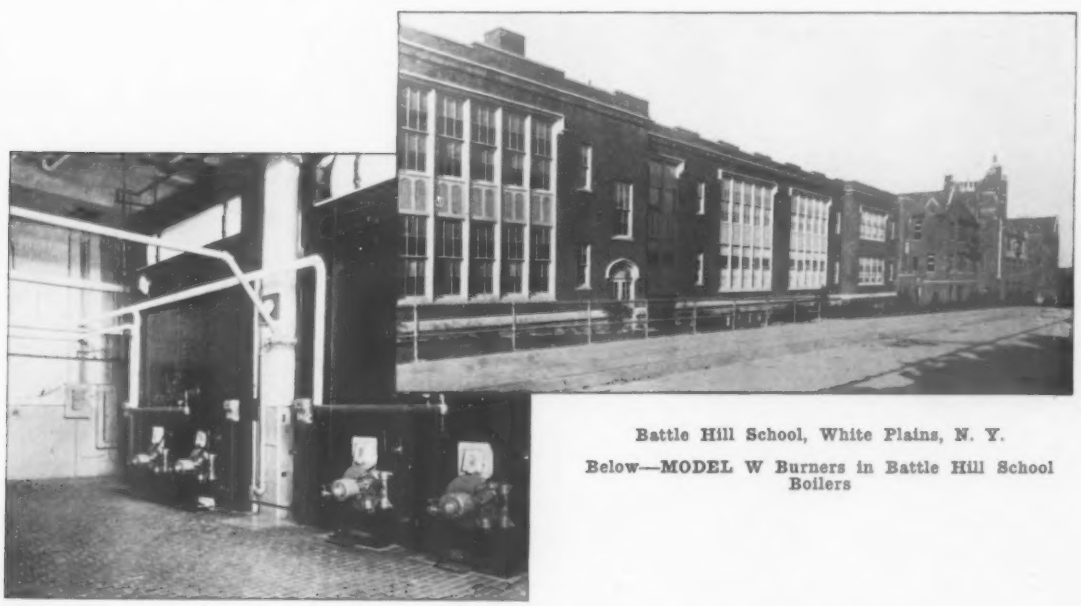
MODEL H Turbine Type Oil Burner Installed in Toledo University, Toledo, Ohio

We suggest that you consult a Petroleum Heat and Power Company representative and accept his recommendation as to the type of burner best suited to meet your special heating requirements. He can be depended upon to give your heating problem an impartial, unbiased analysis.

THREE TYPES OF OIL BURNERS

There are three main types of Petro-Nokol Burners suited to school use: the Petro MODEL W for small or medium-sized buildings—which represents the perfection of engineering design in the horizontal rotary burner, and is known from coast to coast for its remarkable performance qualities, its quiet, trouble-free operation, and its long life; the Petro MODEL M Mechanical Type Burner, which has given utmost satisfaction and economical performance in many buildings throughout the country; and the MODEL H Turbine Burner, the "last word" in air-impelled rotary cup design, which now heats so many of this country's large buildings and is particularly well adapted to multiple boiler installations.

We shall be glad to send illustrated literature on these oil burners to any interested school executive. Our primary interest is the creation of satisfied users of oil heat. We supply both the fuel and the burner. Let us tell **you** about our 100% guaranteed oil heating service.



Battle Hill School, White Plains, N. Y.

Below—MODEL W Burners in Battle Hill School Boilers

THE POWERS REGULATOR COMPANY

40 Years of Specialization in Temperature Control

Chicago
2724 Greenview Avenue

OFFICES IN 43 CITIES
See your phone directory

New York City
231 E. 46th Street

AUTOMATIC TEMPERATURE AND HUMIDITY CONTROL

For Heating, Ventilating, and Air Conditioning Systems

At Harvard, Yale, Princeton, Vassar, Wellesley and hundreds of other prominent educational institutions will be found buildings equipped with the Powers Pneumatic System of Automatic Temperature and Humidity Control.

Over 40 years of experience in developing and installing automatic control for heating, ventilating and air conditioning equipment in all types of old and new buildings qualify us to assist school executives, architects, and engineers on any problem of temperature and humidity regulation.

Powers pneumatic systems often cost more than other types but they are worth more because: they often given 15 to 20 years of accurate and dependable control; practically no repair expense.

Powers thermostats do not get out of adjustment permitting UNDER-heating and OVER-heating which not only wastes fuel but causes discomfort. Neither the extreme heat of Summer, sub-zero temperatures of Winter, nor the vibrations in some buildings, change their adjustment. They need no annual overhauling or adjustment, and the true graduated action of their powerful vapor disc controls valves or dampers gradually—resulting in exceedingly accurate regulation.

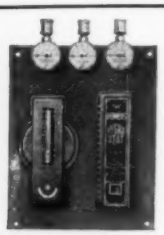
Write for Estimate. Let one of our engineers study your requirements and submit an estimate of the cost of installing the type of control best suited to your needs.

Self-operated Controls. We also manufacture a very complete line of self-operating temperature regulators that do not require electricity or compressed air for their operation. **Write for bulletins,** if interested.

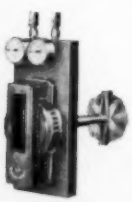
D Thermostat

K Thermostat

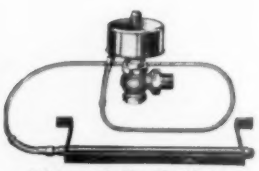
Hygrostat



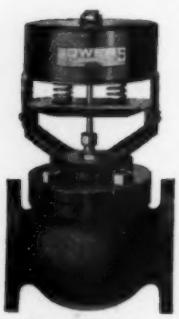
Thermostat and Hygrostat



Duct Thermostat



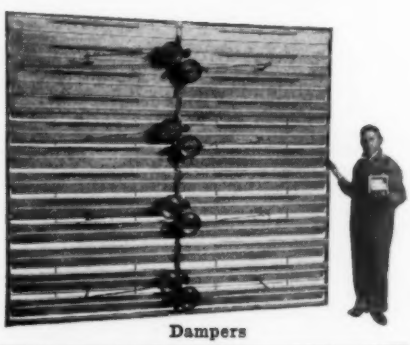
Thermostatic Radiator Valve



Flanged Valve

Globe Valve

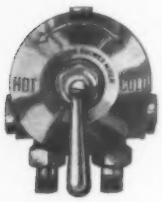
Radiator Valve



Dampers

SAFETY WATER MIXING VALVES

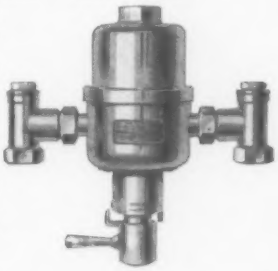
Safety Shower Mixers



A complete line of both pressure equalizing valve and thermostatic shower mixers that absolutely protect bathers from scalding temperatures caused by pressure and temperature fluctuations in pipe lines, and prevent sudden "shots" of hot or cold water. Maximum temperature of delivery can be limited.

Thermostatic Water Controller

For group or gang showers, zone or progressive showers, laundry wash wheels, etc. Will mix hot and cold in quantities up to 100 gallons per minute and deliver at any temperature desired. Is positively scald proof.



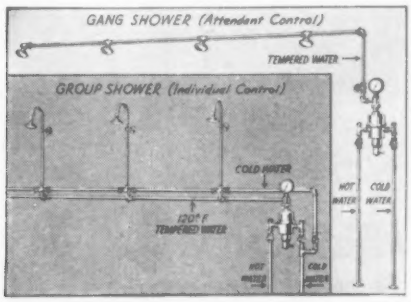
Group or Gang Shower Control—Powers Thermostatic Water Controllers are used for the control of shower baths in groups varying in size from 4 to 20 stalls. They may be used to establish a maximum temperature of hot water supply to protect the entire group from danger of scalding, or to place the entire group of showers under the control of an attendant.

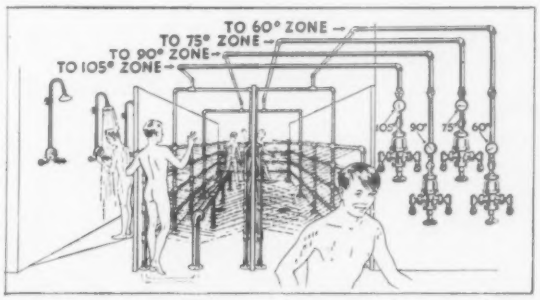
Individual Shower Control is best suited for adults as it permits each bather to individually adjust the temperature of his shower while the hot water is kept at a safe maximum temperature.

Attendant Control is best suited for the bathing of children in schools, institutions, etc., as the temperature of the entire group of showers is adjusted by one individual.

Zone or Progressive Showers—Where compulsory bathing is required before entering swimming pools, lane showers are divided into four zones, each controlled by a Powers Controller. First zone is maintained at 105° F.; second at 90° F.; third at 75° F.; and fourth at 60° F. Because of its efficiency and its hygienic and sanitary advantage, this type of shower is rapidly increasing in popularity.

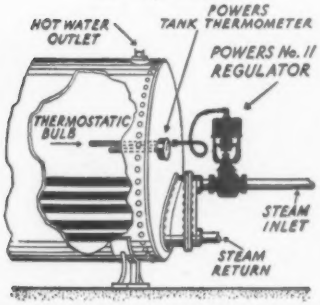
Write today for new 24-page Bulletin No. 258 which shows photographs of the most modern shower installation, gives helpful advice in laying out shower rooms and completely describes Power Safety Water Mixing Valves.





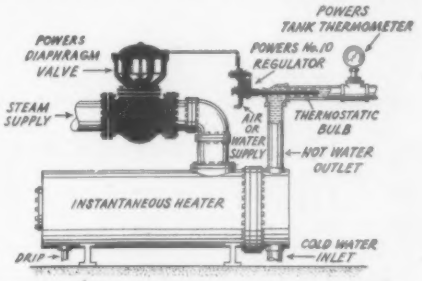
TEMPERATURE CONTROL FOR STEAM HEATED HOT WATER HEATERS

Self-operated



The most complete line of money saving regulators for this purpose. Often pay for themselves during the first year. All steam valve sizes up to 10 inch. **Write for Bulletin No. 2035.**

Compressed Air or Water Pressure Operated



SCOVILL MANUFACTURING COMPANY

Plumbers' Brass Goods Division

Waterville, Connecticut

THIS FLUSH VALVE CLEANS ITSELF!

The Scovill Flush Valve actually takes care of itself! Every time it is flushed, its passages are automatically cleaned of foreign matter and natural minerals from the water. Clogging is eliminated.

Lubrication is automatic, too, from within the valve itself. This means smoother, easier operation, longer service than you can expect from the ordinary type. The Scovill Flush Valve operates efficiently even under low pressures—without water hammer. It may be adjusted from the outside, without a water shut-off.

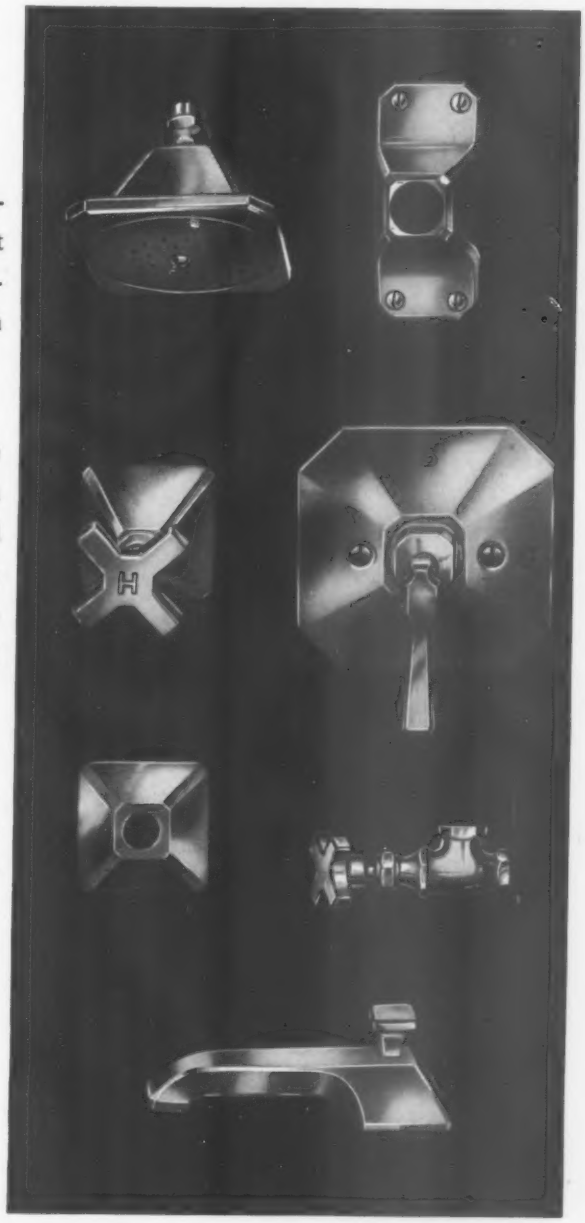
Sturdy construction, long trouble-free service life, and a minimum of attention make this Scovill Flush Valve the most economical equipment for school buildings. Send for the special Scovill Flush Valve catalog—complete with roughing-in dimensions. No obligation.

THESE ARE WELL-DESIGNED FITTINGS— INSIDE AND OUT!

Scovill Shower Fittings will recommend themselves to you both on sight and in use. For both external and internal design come up to equally high standards.

The fittings illustrated here (in the Vogue pattern) are trim and modern in appearance. Efficient operation is assured by the leak-proof, quick-action valves . . . the simplified behind-the-wall construction . . . and other Scovill-patented features.

All Scovill fittings for the shower, lavatory or bath are priced at the lowest figure consistent with high quality. A catalog with complete information is yours for the asking. Address: Scovill Manufacturing Company, Plumbers' Brass Goods Division, Waterville, Conn.



NRA MEMBER U.S. WE DO OUR PART

Protected by U. S. Design patent No. 86,672. Others pending.

SCOVILL FLUSH VALVES—SHOWER, BATH AND LAVATORY FITTINGS—TUBULAR AND MISCELLANEOUS PLUMBERS' BRASS GOODS

THE AMERICAN SCHOOL AND UNIVERSITY

SPEAKMAN COMPANY

Wilmington, Delaware

K-3395—SPEAKMAN Anystream Self-Cleaning Shower Head (Pat. Jan. 2, 1923 and Nov. 3, 1931)

The Speakman Company makes a complete line of showers and shower heads designed especially for schools, colleges, universities and institutions. In designing this equipment consideration has been given to water economy as well as cost of upkeep. We also make a complete line of lavatory fixtures and have recently placed on the market the *Si-Flo* quiet Flush Valve, also the *Si-Flo* Combination.

FLOOD SHOWER

NORMAL SHOWER

NEEDLE SHOWER

Any volume or force from a flood shower to a needle bath now possible by setting the plungers in this new kind of a shower head

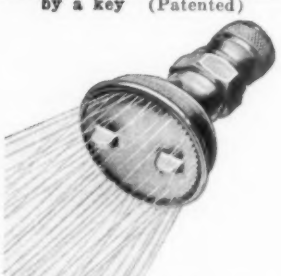
The Anystream Self-Cleaning Shower Head eliminates the annoying feature of all showers—the tendency of holes to become clogged with pipe scale or sediment. **This head has no holes**—instead there are six plungers with tapered slots. As the plungers are moved in or out the character of the spray is changed—all the way in gives a needle shower, all the way out a flood shower. Any in between degree of shower force and volume can be had.

The K-3395 is lever operated while other types such as K-3396, K-3397 and K-3399 are key, wrench or screw operated. These are designed to be flushed at regular intervals by attendants.

Wall type Anystream Self-Cleaning Shower Heads are coming into general use in schools, colleges and institutions, because they are abuse proof and cannot be removed by mischief bent persons. Also for school and institution use the Anystream Self-Cleaning Head is supplied with an extremely short arm which cannot be used as a trapeze. See K-3310 Exposed Mixometer Type Shower designed for institutions. This is but one of many special showers which we make for schools, colleges and general institutional use. Complete literature on these showers also special and regular types of shower heads will be sent promptly.

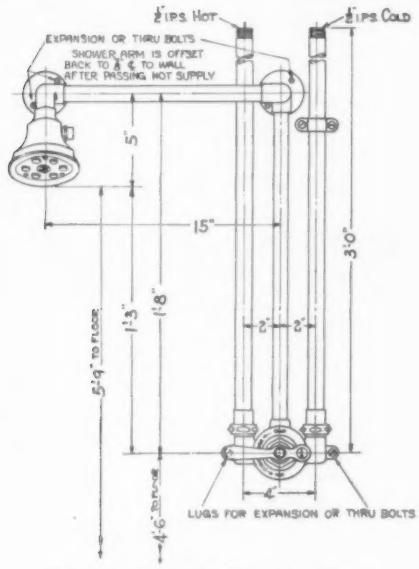
K-3399 — SPEAKMAN Anystream Self-Cleaning Wall Type Shower Head, with ½-inch I. P. female inlet in center of back and arranged to operate by a 5/16-inch hexagon wrench which is furnished

K-3396—SPEAKMAN Anystream Self-Cleaning Shower Head with ½-inch I. P. female inlet and lock-shield arranged to operate by a key (Patented)



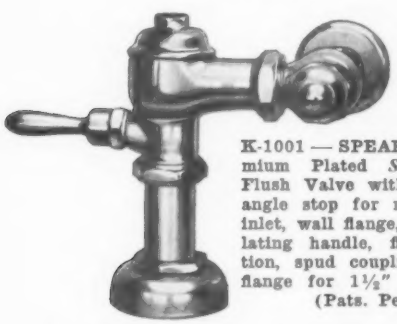
K-7047 — SPEAKMAN Adjusta-Spray Shower Head. (Pat. November 3, 1931, March 15, 1932, June 14, 1932.)

WE MANUFACTURE ALL TYPES OF BATH, SINK AND LAVATORY FIXTURES; ALSO THE SPEAKMAN SI-FLO FLUSH VALVE AND COMBINATION



K-3110—Exposed Mixometer Type, designed for institutions

This school type shower is but one of several shown in Bulletin K-57. Note the short arm holding the shower head. Pipes are almost flat against the wall. There is no chance for boys to stunt on an installation of this sort



K-1001 — SPEAKMAN Chromium Plated *Si-Flo* Closet Flush Valve with 1" capped angle stop for right or left inlet, wall flange, metal oscillating handle, flush connection, spud coupling nut and flange for 1½" top supply. (Pats. Pend.)

Speakman *Si-Flo* * Flush Valve

This flush valve eliminates all hissing noise usually present when flush valves are operated. It is practically silent in operation. In silencing noises, however, we have not taken from the ***Si-Flo*** any of its efficiency. It delivers a cleansing thorough flush every time.

Si-Flo Flush Valves rough-in on standard measurements and can be used for replacement of noisy flush valves or for new installations. They come with right, left, or back supply; built-in-the-wall and seat-action type. They permit close regulation of the flush, which is important in school work for reasons of economy. All valves, unless otherwise specified, are finished in Speakman Chromium Plate—a finish which has proven that it will last for years even under the abuse which we know that flush valves receive in schools.

The ***Si-Flo*** Flush Valve can also be supplied for urinals, roughing-in on standard measurements, right, left, or back supply, also built-in-the-wall type.

* Name, meaning Silent Flow, registered U. S. Patent Office.

K-450—*Si-Flo* Combination

Si-Flo Combination

When the ***Si-Flo*** Flush Valve is installed in combination with the new SPEAKMAN ***Si-Flo*** bowl you are assured that all noises incident to the flushing of a closet will be reduced to an absolute minimum. Due to the construction of the bowl a swirling action is imparted to the water which despite the lack of noise gives a thorough cleansing flush. Bowls can be furnished in regular and elongated types. Seats come in all colors including black rubber composition. Complete literature will be sent promptly on both the ***Si-Flo*** Flush Valve and ***Si-Flo*** Combinations.

Compact piston unit of SPEAKMAN *Si-Flo* Flush Valve

Has Compact Piston Unit

This unit is the only moving part of the Speakman ***Si-Flo*** Flush Valve. It is made of Durez, a bakelite material. All metal parts are Monel Metal. A very important fact to be considered, too, is the low cost of replacing this unit—not more than $1.50. Anyone can make the replacement within a few minutes. Full instructions are included with every unit.

AMERICAN ABRASIVE METALS CO.

FERALUN—BRONZALUN—ALUMALUN—NICALUN

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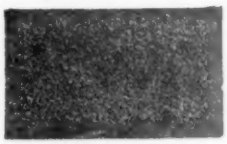
AGENTS IN PRINCIPAL CITIES

HATCH SURFACE

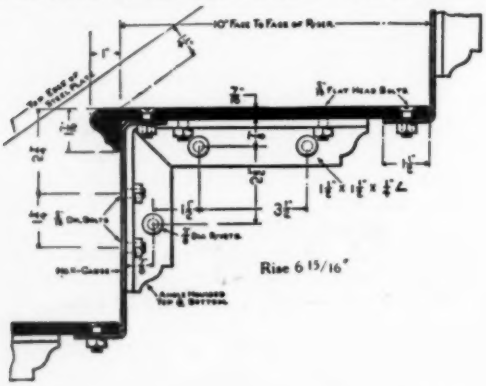
FERALUN
Anti-Slip Treads

Spell SAFETY in Your School



PLAIN SURFACE

FOR NEW BUILDINGS—STYLE "S"



THE STYLE "S" STRUCTURAL TREAD

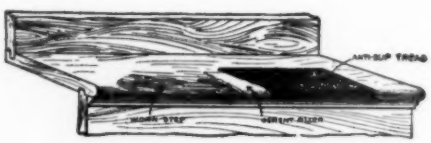
has been especially designed for school installation. Its acceptance by architects and school boards is becoming steadily wider. It affords the most economical as well as the most satisfactory method of insuring safe anti-slip stairways, with complete and permanent freedom from the expense and annoyance of repairs or renewals.

Style "A"
WITH METAL ANCHORS FOR NEW CONCRETE STEPS

SAFE STAIRWAYS PREVENT ACCIDENTS

THE AMERICAN SCHOOL AND UNIVERSITY

FOR REPAIR WORK—STYLE "A"



THE STYLE "A" TREAD

is widely used for the repair of worn stairs. Typical conditions are shown above. Repairs so made are inexpensive and permanent.

This type of tread is also recommended for use with new concrete stairs.

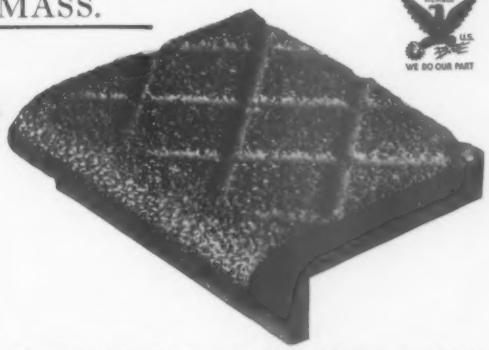
FERALUN—BRONZALUN—ALUMALUN—NICALUN—The abrasive treads with the deeply impregnated grit.

Originators and developers of abrasive metal treads.

Write for details and prices

AMERICAN MASON SAFETY TREAD CO.

GENERAL OFFICE AND FACTORY
LOWELL, MASS.



PREVENT ACCIDENTS WITH AMERICAN MASON SAFETY TREADS

American Mason Safety Treads provide almost complete immunity from slipping. In addition, they insure greater durability for stairs of any type. They are especially desirable for stairs in school buildings wherever the traffic is heavy, for thresholds of doors, and for ramps and floors around heavy machinery in school shops. Suitable for use on granite, marble, slate, cement, iron or wood—new or old construction—they are especially desirable on concrete stairs, as they prevent the raw edge from chipping off.

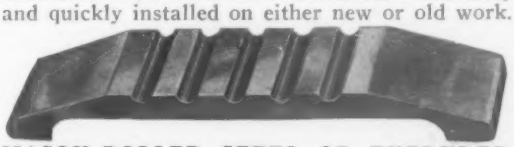
REPAIR WORN STAIRS WITH AMERICAN MASON SAFETY TREADS

For repairing purposes, Mason Safety Tread is ideal. The worn portion of the stair is built up to the level with Karbolith or cement filling, on which is placed the Safety Tread. Steel, Brass or Aluminum Nosings may be attached to the Safety Tread for attractive finish or to cover up the filling on badly worn stairs.

Our long experience enables us to give directions for the repair of any stairway, of any material and any degree of wear. We will furnish without obligation suggestions, sketches or blueprints, showing just how the work can best be accomplished and at the lowest cost.

A SAFETY TREAD OF ABRASIVE METAL

Above is shown a special cast metal type of American Mason Safety Tread, in which a carborundum or aluminous abrasive has been embedded in the wearing surface of the molten metal. The flint-like particles of the abrasive project above the surface, which effectively prevents slipping, whether wet or dry. The treads can be furnished in three surfaces—fluted, diamond-hatched as above, or plain. The body metal may be of iron, bronze, aluminum or nickel, dependent upon the type of service for which the tread is intended or the architectural effect desired. Certain styles require no subtread and can be used with or without a riser. These treads are easily and quickly installed on either new or old work.



MASON ROLLED STEEL OR EXTRUDED BRASS DOOR SADDLES

These are recommended wherever appearance and protection against wear and slipping are desired. Door Saddles are furnished with corrugated surface as illustrated, cut to required length, drilled and countersunk for screws.

BEFORE REPAIRING

AFTER REPAIRING

Write for a copy of our illustrated booklet and the name of our nearest agent

AMERICAN MAST & SPAR CORPORATION

Established 15 Years

149th St. and East River, N. Y. C.

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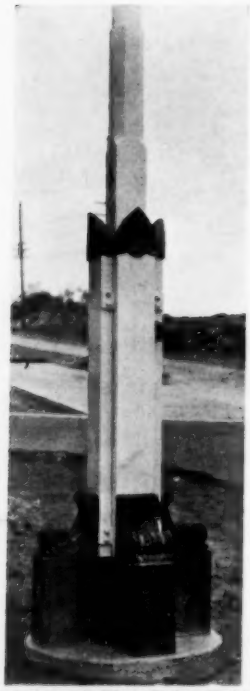
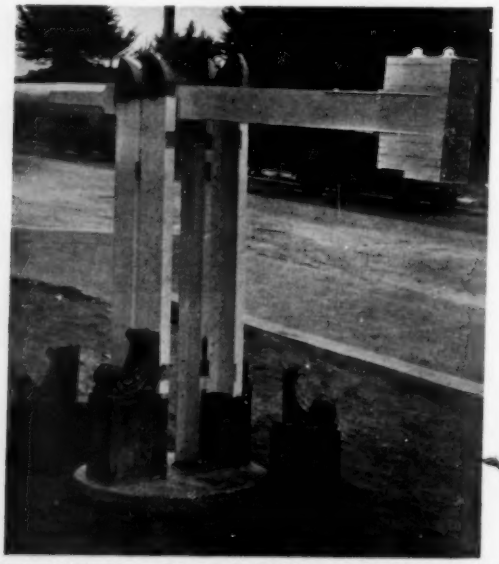


Counterbalanced Flag Pole, Unit "A" in a Raised Position; for Ground Setting



Unit "A" in a Lowered Position with Ornamental Base Removed Makes a Beautiful Setting for Schools. Prices gladly furnished

MANUFACTURERS OF ALL KINDS OF FLAG POLES

Tapered and swaged jointed, manufactured out of aluminum, bronze and copper-bearing steel, also flag poles, yacht spars and masts out of selected spar timber.

TOP MAST FLAG POLES

specially designed for yacht clubs, country clubs, golf clubs, homes, amusement parks and schools made in all sizes by shipbuilders who are master craftsmen. All of our poles are equipped with Board of Education revolving trucks.

COUNTERBALANCED FLAG POLE UNIT "A"

in a lowered position, with ornamental base removed. If architects prefer, they can design their own bases to fit our units. We will furnish all measurements. Poles are manufactured out of selected yacht spar timber and can be made up to a height of 48′ for this unit. Poles are painted three coats of outside white marine paint. Base and trimmings can be of bronze, aluminum or cast iron. This makes a beautiful setting for schools and parks. Prices gladly furnished.

THE BARRETT COMPANY

Manufacturers of Roofing and Waterproofing Materials

40 Rector Street, New York, N. Y.

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Products

ROOFING MATERIALS—For Flat Surfaces: Barrett Specification Pitch and Barrett Specification Felt; Black Diamond Pitch and Black Diamond Felt.

For Steep Surfaces: Barrett Specification Felt, Barrett Specification Pitch, Anchor Asphalt and S. I. S. Roofing. Barrett Asphalt Shingles and Roll Roofings.

MISCELLANEOUS—Waterproofing for foundations, swimming pools, tunnels, floors, etc., special specifications submitted. Insulating and Building Papers, for sheathing, lining, etc. Damp-proofing and Protective Paints, Wood Preservatives. Tarvia-lithic for playground surfacing, roadways, paths and tennis courts.

For complete information about these and other products, write The Barrett Company, 40 Rector Street, New York City.

The Most Dependable Roof Protection America Has Developed

It is significant that Barrett Roofs protect thousands of the finest school buildings in a nation which is particularly careful of its children.

Barrett Specification Roofs combine the maximum of safety with the maximum of service. They carry Fire Underwriters' Class A rating—the highest assurance of fire-safety. Their gravel or slag surface is immune to flying sparks and embers.

Barrett Specification Roofs

TRADE-MARK

Bonded against repair and maintenance expense for periods up to twenty years, Barrett Specification Roofs continue to give expense-free, trouble-free service for many years beyond the terms of their bonds. Hundreds of Barrett Roofs laid 30, 40 or 50 years ago are still in first-class condition today.

Barrett Specification Roofs are applied by Barrett Approved Roofers, each selected by Barrett on the basis of his proved ability, experience and integrity. There is a Barrett Approved Roofer near you who can offer the complete Barrett Roof Service. Consult with him or with us on any roofing or waterproofing problem.

Free Roof Inspection Service by Barrett

For many years, The Barrett Company has offered building owners an unique service that has been the means of saving many thousands of dollars in upkeep expenses. On request, a Barrett Roof Inspector will make a careful survey of your roofs, flashings, copings, parapets, etc., and render a complete unbiased report. This service is free on buildings with roof areas of 5,000 square feet and up, located east of the Rockies.

COLUMBIA HIGH SCHOOL, SOUTH ORANGE, N. J., IS PROTECTED BY 45,000 SQUARE FEET OF BARRETT ROOFS. ARCHITECTS: GUILBERT AND BETELLE, NEWARK, N. J.

THE ELECTRIC STORAGE BATTERY CO.

World's Largest Manufacturers of Storage Batteries for Every Purpose

Allegheny Avenue and Nineteenth Street, Philadelphia

BRANCHES IN 17 CITIES THROUGHOUT THE UNITED STATES

NRA CODE

SAFEGUARD YOUR AUDITORIUMS AND GYMNASIUMS

WITH

Exide Keepalite

Automatic and instantaneous in operation

Emergency Lighting System can be had for as little as $150

EMERGENCY LIGHTING BATTERY SYSTEMS

Your auditorium or gymnasium is crowded with pupils at lectures, plays, sports, or dances. What would happen if lighting current should suddenly fail?

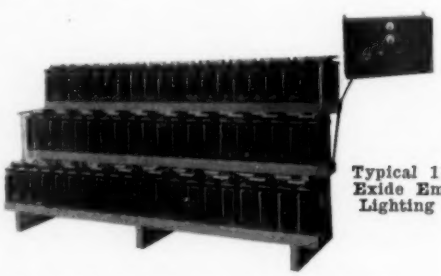
Total darkness would result. Even exit lights would be useless. Inconvenience, confusion and danger might easily follow. Unfortunately, lighting failures do happen, despite every precaution taken by light and power companies to prevent such service interruptions. They are powerless to prevent electrical, rain, sleet, snow and wind storms from bringing down power lines which quite frequently cut off the electric service to towns and even whole groups of communities. Fires, floods, explosions, street accidents, blown fuses and short circuits also contribute to the total of power interruptions. The dangers of lighting failure can be eliminated in your school with an absolutely dependable Exide Emergency Lighting System. They are **automatic** and **instantaneous** in operation. Can be had for as little as $150.

Exide Keepalite the new low cost emergency lighting system

Areas up to 10,000 square feet can be protected with Exide-Keepalite. Keepalite furnishes a dependable source of emergency lighting current which may be concentrated within a limited area to provide light equalling normal lighting; or, it may be used to supply enough light for visibility in larger areas.

Exide-Keepalite is a self-contained emergency lighting system which supplies a separate source of electric current to its own high efficiency low voltage lamps. Keepalite consists of: an Exide Battery, automatic relay, battery charger, signal and switches—all assembled in a compact, attractively finished case. Price $150.

Wherever emergency lighting protection is required for entire buildings, large 115-volt Exide Emergency Lighting Systems are available. These systems consist of Exide Batteries and reliable devices to automatically control and charge the battery. The operation of these systems is absolutely dependable. Furthermore, they are self-sustaining since they automatically and instantaneously furnish the needed electric current during the full emergency period without a hand touching a switch, and because they automatically recharge the battery after the emergency discharge.



Typical 115-volt Exide Emergency Lighting System

Dependable Exide Laboratory Batteries Available in Any Size, See Page 363

GRAYBAR ELECTRIC COMPANY

Executive Offices: Graybar Building, Lexington Ave. and 43rd Street
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Asheville, N. C.	Davenport, Iowa	Jacksonville, Fla.	Norfolk, Va.	San Antonio, Texas
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Baltimore, Md.	Denver, Colo.	Knoxville, Tenn.	Oklahoma City, Okla.	Savannah, Ga.
Beaumont, Texas	Detroit, Mich.	Los Angeles, Calif.	Omaha, Nebr.	Seattle, Wash.
Birmingham, Ala.	Duluth, Minn.	Louisville, Ky.	Philadelphia, Pa.	Spokane, Wash.
Boston, Mass.	Durham, N. C.	Memphis, Tenn.	Pittsburgh, Pa.	Syracuse, N. Y.
Brooklyn, N. Y.	Flint, Mich.	Miami, Fla.	Portland, Ore.	Tacoma, Wash.
Buffalo, N. Y.	Ft. Worth, Texas	Milwaukee, Wis.	Providence, R. I.	Tampa, Fla.
Charlotte, N. C.	Fresno, Cal.	Minneapolis, Minn.	Reading, Pa.	Toledo, Ohio
Chicago, Ill.	Grand Rapids, Mich.	Mt. Vernon, N. Y.	Richmond, Va.	Washington, D.C.
Cincinnati, Ohio	Hammond, Ind.	Nashville, Tenn.	Roanoke, Va.	Wichita, Kan.
Cleveland, Ohio	Harrisburg, Pa.	New Haven, Conn.	Rochester, N. Y.	Worcester, Mass.
	Hartford, Conn.	New Orleans, La.	St. Louis, Mo.	Youngstown, Ohio

PRODUCTS

The Graybar Electric Company brings to meet any and every electrical need for schools and colleges more than 60,000 electrical supplies—supplies whose dependability is warranted by Graybar's 65 year old quality reputation.

The 74 distributing houses listed above bring these supplies within arm's reach of demand everywhere, making instantly available everything electrical, to transmit, apply and control electricity in school and college buildings.

INTER-COMMUNICATION

School boards, superintendents, and architects can well appreciate the importance of an interior telephone system that knits all the individuals of the teaching staff together — without, at the same time, requiring the services of an operator. Graybar Inter-Phones are simple to operate. The user merely pushes a button to make a connection.

In addition, Graybar supplies many other types of electrical signalling equipment for schools, including bells, buzzers, annunciators, and gongs of every variety with all accessory equipment. Write us for more detailed information.

PUBLIC ADDRESS SYSTEMS

With the installation of a Public Address System music, speech or radio programs may be amplified and distributed undistorted via loudspeakers throughout a school. Manufactured by Western Electric, this equipment has more than 50 years' experience in making sound transmission apparatus to guarantee it.

With this system, the principal's voice, for example, can be distributed to as many rooms as desired. Visiting speakers can be heard throughout the school without the necessity for pupils leaving their rooms. Radio programs or recorded music from the Music Reproducer can also be distributed. (For other details, see Western Electric, Pages 252, 253.)

LIGHTING EQUIPMENT

A complete selection of fixtures, glassware and accessory products to meet the specialized needs of school and college buildings is easily available through Graybar.

Lighting specialists from Graybar can help architects and school boards secure the most efficient installation. The Graybar Electric Company has given the problem of proper school lighting special study and has developed a line of lighting fixtures and glassware well suited to school and college needs.

LAMPS

Mazda Lamps are available on quick call at Graybar Electric Company distributing houses located in 74 principal cities throughout the country.

These well-known, extremely efficient lamps are stocked in the five standard sizes—25, 40, 60, 100 and 200 watts—adopted to simplify ordering.

WIRING SUPPLIES

Graybar Electric Company distributing houses carry large stocks of wiring supplies for power, light and inter-communication construction and maintenance. This includes wire, conduit, wiring devices, conductors, etc., for all purposes. All materials are of the highest quality, the products of long established, well-known manufacturers.

60,000 OTHER ITEMS

The above products cover only a very small portion of the 60,000 products distributed by Graybar. For complete information covering these or other electrical products for schools and colleges address the nearest Graybar office, or Graybar Electric Company, Lexington Ave. and 43rd St., New York, N. Y.

THE HOLTZER-CABOT ELECTRIC CO.

Boston, Mass.

The Holtzer-Cabot Electric Co., Ltd., Montreal, Canada

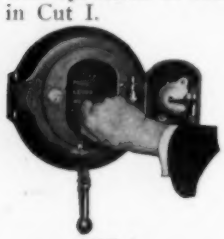
SCHOOL FIRE ALARM SYSTEMS

The functions of a fire alarm system in a school, should be: First, to so train the children by means of periodical fire drills that they will vacate the building quickly and without confusion; and Second, to call automatically the city fire department in case of actual fire. Any system which performs less than this is not giving to school children the fullest measure of protection from fire panic which should be theirs. Experience has shown that the best and most orderly response to fire alarm signals is secured in those communities where fire signals are uniform in all schools and are not used for any other purpose.

To best meet the above requirements, The Holtzer-Cabot Electric Co. unqualifiedly recommends its standard:

S. A. Fire Alarm System

This system is complete in that it provides for sounding a fire drill signal or a signal for actual fire that are both identical as far as the pupils can tell, with absolutely no chance of summoning the city fire department except for an actual fire. The operation of sounding a fire signal is shown in Cut I.



CUT I

CUT II

The sounding of an alarm for fire drill only is as shown in Cut II in which the front of the box is opened with a key. The opening of this door operates contacts which prevent the city fire alarm box from operating when the lever is pulled

The entire system including all boxes and gongs and every foot of wire is supervised electrically so that any disarrangement of apparatus or break in any of the wiring is instantly indicated by a warning or trouble bell. All wiring, current feeders, etc., are centralized at a control panel provided with volt and ampere meter, relays, pilot lamps, etc., so arranged and connected as to facilitate the ready location of broken wires or other troubles that might impair the operation of the system.

The gong used with this system is of the electromechanical type, entirely distinctive from any other type of bell so that a fire signal can never be confused with other school signals

Complete detailed information covering these and other fire alarm systems are available by writing for bulletin on School Fire Alarm Systems.

SCHOOL TELEPHONE SYSTEMS

Hundreds of schools and colleges all over the country are equipped with Holtzer-Cabot Telephone Systems; the broad and almost exclusive experience thus gained, enables this company to meet exactly the requirements and conditions of any size or type of school.

Switchboard Systems should be installed in commercial high schools and used for educational purposes, even though the telephone demands of the school do not actually require it. At the same time, however, the system can be used for the school service.

NO. 1480101

The service obtained from this system is the same as that given by public telephone systems. An operator must be on duty at the switchboard to answer calls from the various rooms and to connect and signal the telephones called.

The operator usually, also the secretary or stenographer, has supervision over all connections by means of lamp signals associated with the lines and cord circuits. As many conversations can be carried on at one time as there are cord pairs.

Masterphone Systems will be found fully adequate in small schools where an operator is not always in attendance. The principal's office becomes the "exchange" or central office.

With this system the principal can talk to any classroom and any classroom can talk to the principal. The different classrooms can communicate with each other, but only through the principal's office. He, therefore, can check all conversation and may, if he wishes to, eliminate unnecessary calls between classrooms.

Further, with this system, in addition to the audible signal, all calls are registered on an annunciator.

HOLOPHANE COMPANY, INC.

342 Madison Ave.
New York

WORKS—Newark, Ohio

CANADIAN OFFICE: Toronto

SCIENTIFIC LIGHTING *for* EVERY SCHOOL NEED

"IN-BILT" AUDITORIUM LIGHTING

SPECIAL LIGHTING FOR CORRIDORS

VAPOR-PROOF LIGHTING IN LABORATORY

HOLOPHANE Planned Lighting produces the greatest amount of useful light from a given investment in electric current and lamps.

In schools and colleges throughout the country Holophane proves its educational value by conserving eyesight and promoting better work.

For every area in your school—indoor and outdoor—there is a Holophane unit specifically adapted to provide the most appropriate illumination at the lowest operating cost.

A highly specialized engineering department is maintained for the purpose of giving free planning and specification service on lighting. Just state **your** problem, and leave the solution to Holophane.

Holophane
Trade Mark

HOLOPHANE
PLANNED LIGHTING
produces the greatest amount of useful light

JOHNS-MANVILLE

22 East 40th Street, New York, N. Y.

Offices in all large cities

J-M Acoustical Treatment

There are two classes of acoustical correction for schools and universities. The first requirement is that of auditoriums and large class rooms where it is desirable to have the words of speaker or teacher distinctly audible in every seat; or where music may be presented without causing disturbing echoes or reverberations.

The second class of correction is required for reducing noise to an undisturbing level in halls, corridors, study halls, gymnasiums, swimming pools, restaurants and kitchens. Science has proved by conclusive tests the advantages of quiet for study and, conversely, the injurious effect on the nervous system that results from constant exposure to noisy surroundings. This means that acoustical treatment is really a **health** measure.

Johns-Manville pioneered in the development of the science of sound control and have a large staff of acoustical experts available for consultation either on proposed buildings or existing school or college structures.

J-M ACOUSTICAL TREATMENT APPLIED TO THE ASSEMBLY HALL OF JOHN HAY HIGH SCHOOL, CLEVELAND, OHIO

There is a wide range of J-M sound control materials adaptable to the needs of any kind of room. They can be applied over any present wall or ceiling surface and lend themselves readily to any desired decorative scheme.

For complete information, ask for brochures "Acoustical Correction" and "Solving the Growing Problem of Noise."

J-M Bonded Built-Up Roofs

The construction of most school and college buildings is admirably suited to the protection afforded by a J-M Bonded Built-Up Roof. There are more than 20 types of J-M Roofs to select from.

THE TILDEN HIGH SCHOOL, BROOKLYN, PROTECTED BY A J-M BUILT-UP ROOF

All worry and care about leaks, fire and upkeep is removed for a specified term of years. Depending on the grade of roof selected, a bond backed by Johns-Manville and the National Surety Company will be issued to the purchaser —for 10, 15, or 20 years.

J-M Asphalt Tile Floorings

Johns-Manville Asphalt Tile Flooring, Type A, is a resilient, quiet, decorative floor covering produced in tile units of various sizes and colors, applicable over practically any sub-floor which is smooth and firm.

These tiles are long-wearing, comfortable, stain-proof, fire-resistant, of pleasing appearance and low in cost.

J-M Heavy Duty Asphalt Tile is a new type of flooring especially designed for severe service such as that encountered in school corridors, halls, lobbies, etc. Though resilient, it is strong and virtually abuse-proof. It may be installed below grade where damp conditions prevail and can also be applied directly to smooth wood subfloors without the usual leveling course.

For full details, write for brochure.

H. L. JUDD COMPANY, INC.

Founded 1817

Contract Division

87 Chambers Street, New York, N. Y.

Flag Poles

Fine grade wood Flag Poles ranging in sizes from 6 feet up to 16 feet. Brackets to fit.

Pull-Down Window Poles

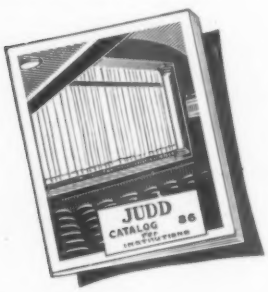
Pull-Down Window Poles with Hooks. Lengths up to 16 feet. Necessary in every institution.

Curtain Track

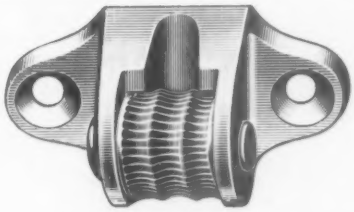
Track for every purpose. Stage Curtain Track and Track of all kinds for small and large windows.

JUDD PRODUCTS

Among the thousands of items manufactured by Judd are many ideally suited to new buildings and modernization programs. Stage Curtain Tracks, Window Curtain Tracks, Extruded Nosings, Edgings and Bindings, Flag Poles, Window Poles, Window Shade Accessories, Wardrobe Hardware, Shower Rods — Brackets — and Curtains, and other equipment necessary in schools and universities.

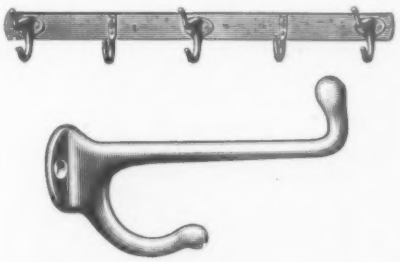


You should have this reference book of institutional hardware. Write for a copy!



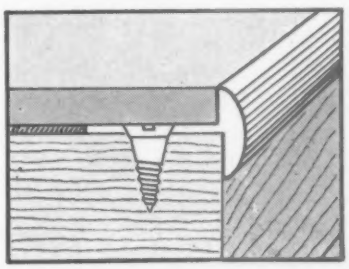
Shade Hardware

Standard Shade Hardware including Brackets, Shade Pulls and Stop Pulleys as shown above that will hold a shade automatically in any position.



Wardrobe Hardware

Metal Coat and Hat Racks. Coat and Hat Hooks. Clothes Trees. Closet Poles and Brackets in both wood and metal.



Extruded Edgings, Nosings and Bindings

For edging desks, tables, manual training benches and similar objects. Nosings and Stair Plates for protecting the edges of stairs.

KAUSTINE COMPANY INC.

Engineers and Manufacturers of Sewage Disposal Equipment

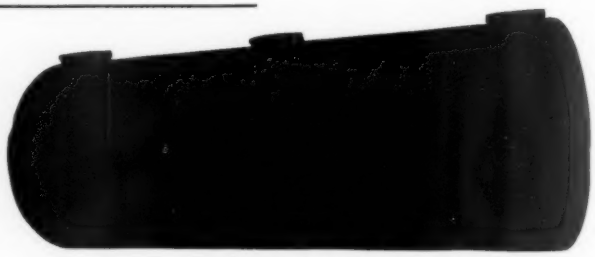
Perry, N. Y.

PRODUCTS

Kaustine Septic Toilets, the modern sanitary indoor toilet system for the healthy rural school; and

Kaustine Septic Tanks, vertical type, for homes, small schools and institutions, and horizontal type, for use in schools where larger capacities are required.

Kaustine Septic Tanks and Toilet Systems are completely constructed ready for installation. It is not necessary to do any construction work on the ground where they are to be installed. Simply make the excavation, place the tank in the hole and cover it with earth.

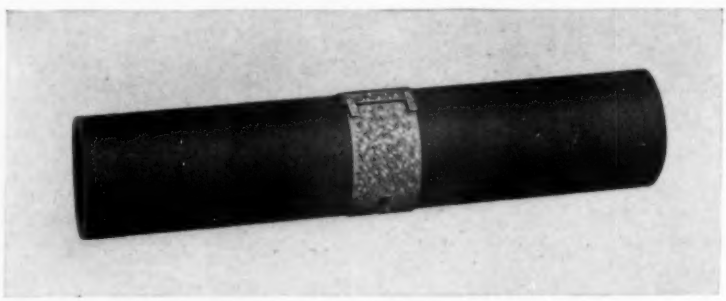


KAUSTINE HORIZONTAL TYPE SEPTIC TANK

KAUSTINE SEPTIC TOILETS

In rural schools all over the country, a necessary evil in the past was the old-fashioned outdoor toilet with its inconvenience, its inaccessibility, its exposure to cold, illness and disease. It is no longer necessary today. From every standpoint, it is a menace. In selecting modern equipment to replace the nuisance of improper sewage disposal, it is dangerous to employ guesswork. The problem is one for a competent engineer — who will study ground structure, moisture content, climatic conditions, rock strata and soil composition, and devise a sanitary indoor toilet system made to suit your school's exact needs.

The Kaustine Septic Toilet has all the advantages of flush toilets without requiring a supply of running water. Each part is designed to furnish long, continuous service. The bowl of vitreous china has a smooth, form-fitting seat hinged with bright nickel. All the sheet metal parts, including the tank below, are of Armco ingot iron, the most durable of all metals for this purpose. The cost is surprisingly low. No chemical is needed for its operation.



E-Z DRAIN TILE CONNECTOR—STYLE NO. 2

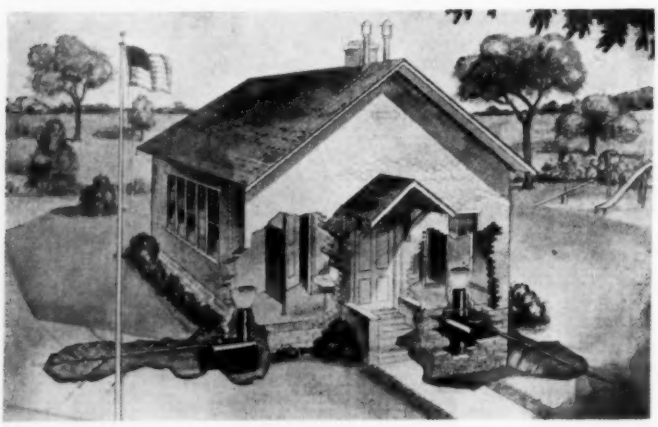
Here is another Kaustine product of value to schools—used for permanent, trouble-free installation of absorption bed tile, for draining lawns, athletic fields, etc. Write for full description

KAUSTINE SEPTIC TANKS

For schools where running water is available, but sewer connections are lacking, the Kaustine Septic Tank is the solution. Made entirely of Armco ingot iron, with its well-known high rust-resisting qualities, the Kaustine Septic Tank is available in two types—the vertical tank, for homes and small institutions, and the horizontal tank (illustrated above) adapted for use where larger capacities are required.

As an additional protection against corrosion, the Kaustine Septic Tank is coated inside and outside with plastic enamel. Another Kaustine feature is the removable top, or in the larger tanks, the manhole covers, held in place by brass nuts, insuring easy and speedy removal of the contents.

Write for illustrated circulars



At the left is shown a one-room rural school with Kaustine Septic Toilets installed. The system on the left side has the manhole outside the building; the system on the right side has the tank entirely within the basement

KERNER INCINERATOR COMPANY

3701 North Richards Street, Milwaukee, Wisconsin

OFFICES AND AGENCIES IN OVER 150 CITIES

PRODUCTS

KERNERATORS: For the prompt, safe, and sanitary disposal of all kinds of rubbish (including garbage) by incineration. Manufactured in four types:

Flue-fed
Basement-fed
Estate (downdraft)
Gas-fired ("Commercal")

Of the first three types, there are sizes and layouts to fit the need of large and small schools, both public and private, and for college and university dormitories, in either existing or contemplated buildings.

Importance of the Kernerator for All Types of School Buildings

It is the constant purpose of school board members, school superintendents, architects, builders and all those responsible for school design and construction to make certain that equipment is provided that will promote safety and sanitation in school buildings.

Kernerator Commercial Expressly designed for School Cafeterias

Safety

There are probably no buildings in which the immediate and sanitary disposal of waste is as important as in schools. Statistics show a large percentage of fires are due to accumulations of loose waste paper and rubbish in school basements. Bailing paper is a doubtful economy.

Sanitation and Hygiene

The KERNERATOR provides a convenient, sanitary and economical method for handling all sweepings, lunch remains, garbage from the cafeteria (if there is one) and all promiscuous waste.

There is no denying the fact that the sanitary waste from girls' washrooms is a constant source of maintenance expense for the cleaning out of clogged drains and damage from flooded toilets. This occurs in spite of receptacles placed in the washrooms.

Flues may be so located that one set of hopper doors will open into the girls' washrooms. This idea has been adopted by a number of architects (names upon request) with very satisfactory results in actual operation.

Economy

The KERNERATOR eliminates the expense of labor, time and equipment in handling, storing and transporting rubbish and garbage; the necessity of daily collections of waste paper and sweepings—frequent trucking. It also cuts the cost of plumbing repairs due to drains stopped by sanitary waste in girls' washrooms.

The Kernerator Commercial

This incinerator was developed for the sole purpose of disposing of garbage from cafeterias and restaurants.

It is easily installed, covers a floor space of only 39″ x 28″, is exceedingly economical to operate and costs considerably less than the bricked-in type.

It uses gas or coal, and will handle the garbage from the largest cafeterias or restaurants.

Service

The KERNERATOR is made and sold by the pioneer in the flue-fed incineration field. Satisfactory operation is guaranteed by a financially sound organization having a stable, trained corps of incinerator experts with a wide experience in school installations.

Further Information

When you are making plans for a school building, may we send a specialist to discuss your waste disposal problems? He will be glad to recommend the proper type and size of equipment depending upon the number of rooms, number of pupils, and the height of the building.

Literature

Send for the new pamphlet "The School Incinerator" giving full information and a list of KERNERATOR installations in over 300 schools.

KNAPP BROTHERS MANUFACTURING CO.

Manufacturers

REPRESENTATIVES IN ALL THE PRINCIPAL CITIES

Main Office: CHICAGO, ILL.
605 W. Washington Blvd.

Knapp SANITARY METAL TRIM

Established 1905

Manufacturers of a complete line of metal trim, corner bead, metal lath and metal Specialties. See our pages in Sweet's Catalog

PRODUCTS

Metal Corner Bead, Metal Lath, Metal Lath Accessories

and

Sanitary Metal Trim and Specialties

THE NEW RINDGE TECHNICAL SCHOOL, CAMBRIDGE, MASS.
Ralph Harrington Doane, Architect, Boston, Mass.

Four and one-half miles of Knapp Metal Base; four miles of Knapp Panel and Dado Moulding; two and one-half miles of Knapp Sanitary Window Trim; three miles of Knapp Picture Moulding; two-thirds of a mile of Knapp Chalk Trough! This tells only a part of the story of Knapp Metal Trim for the Rindge School.

Hundreds of outstanding schools and educational buildings testify to the enduring excellence and economy of maintenance of **Knapp Sanitary Metal Trim.**

Of equal importance, although less obvious, is the silent and concealed service rendered by **Knapp** plastering accessories —Corner Beads, Flush Casings, Concealed Picture Mouldings, Base Screeds, etc.

We **invite** your **investigation** of our **New** Metal Lath. Not just another lath; it is a different and fundamentally correct lath, designed to produce a **better** plastering job. Insist on our trademark.

Knapp DIA$^{gonal}_{mond}$ RIBBED LATH

Patents pending

THE AMERICAN SCHOOL AND UNIVERSITY

THE LANDIS PROGRAM CLOCK COMPANY

GRAYBAR ELECTRIC CO., DISTRIBUTORS

Waynesboro, Pa.

LANDIS PRODUCTS FOR SCHOOL AND COLLEGE USE

The Landis System includes a complete line of high-grade Master Clocks, Secondary Clocks, Program Machines, Control Panels, Program Bell Push Button Boards and Special Time Control Apparatus. Its completeness and flexibility enables the school architect to select equipment to meet the most exacting requirements for either large or small school.

All Program Bells, Buzzers, Horns, etc., also Fire Alarm and Telephone Systems furnished with Landis equipment are of the highest quality.

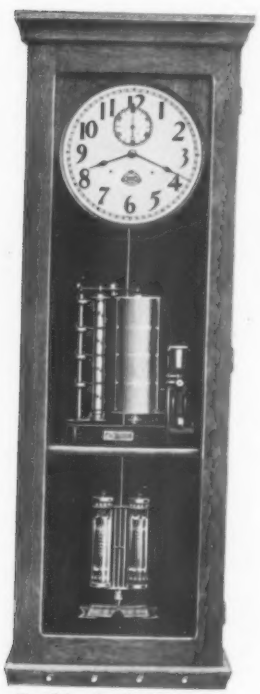
Landis also manufactures a complete line of Laboratory Voltage Distribution Control Panels, Instructors' Panels, Student Table Outlets, etc., for use in science laboratories.

TYPE OF SYSTEM

The Landis System is the minute impulse type of electric time system whereby any number of secondary clocks and automatic program machines for indicating and signaling time can be operated and controlled by one master clock. This type of system is by far the most rugged, simple and economical, and is greatly preferred where there is a necessity for group controlling of clocks. It results in uniform time and signals, making possible coordinated action and efficiency.

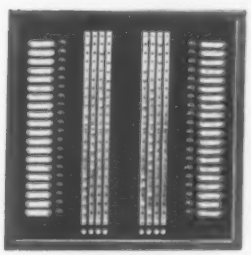
The Landis Minute Impulse System is furnished with automatic hourly synchronizing control whereby program devices and secondary clocks are checked hourly and if necessary reset to correct time of master clock if ever disturbed due to current interruptions or other outside irregularities.

Write for illustrated booklet, "Landis Electric Time and Program Clock Systems," or consult the nearest Graybar distributor



Combined Master and Program Clock
1-Minute Type Program Machine

Style 2M
Round Metal
Secondary Clock



Push Button and Cross Connecting Board

Style 3S
Square Wood
Secondary Clock

Secondary clocks made in a wide range of styles and size, also double dial clocks, and ornamental marble and skeleton dial clocks.

Distributed and guaranteed by Graybar

OFFICES IN 74 PRINCIPAL CITIES

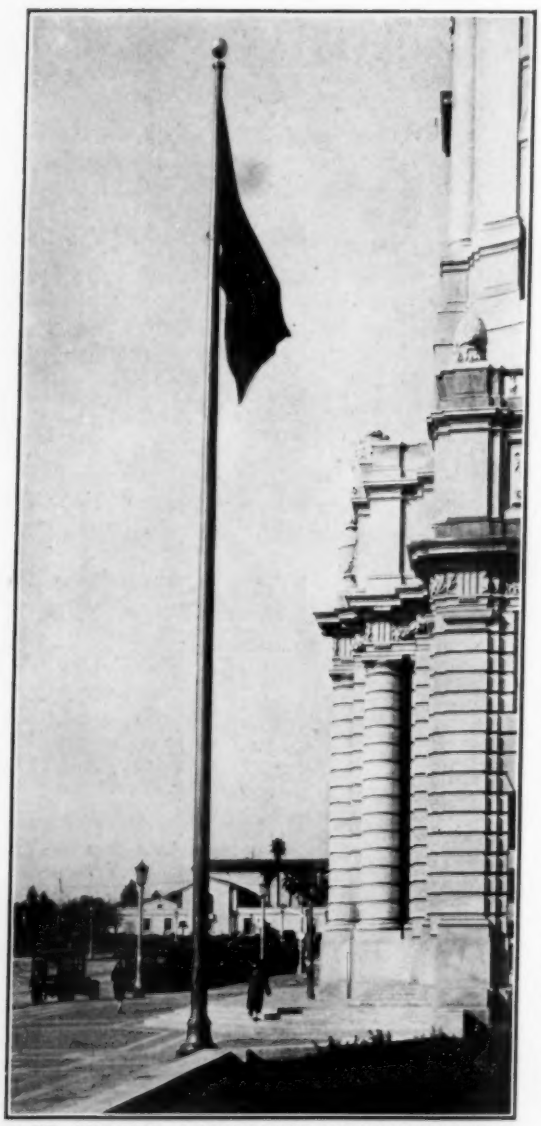
Established 1897

JOHN E. LINGO & SON, INC.

Manufacturers of

Flagpoles in Copper Bearing Steel, Bronze and Aluminum

29TH STREET & BUREN AVENUE, CAMDEN, N. J.



72-FT. OVERALL CONTINUOUS ENTASIS TAPERED COPPER-BEARING STEEL FLAGPOLE

12¾-in. butt x 5-in. top. One of two installations at Civic Center, Pasadena, Calif.

FOUR DISTINCT TYPES OF FLAGPOLES

Continuous Straight Tapered Flagpoles are made of steel in one piece in lengths from 20 feet to 100 feet and are tapered conically with a smooth uninterrupted exterior surface throughout without visible points or offsets. These poles are standardized and carried in stock for immediate shipment, and are sold in the same price range as the extra heavy swaged sectional poles.

Continuous Entasis Tapered Flagpoles are made of copper-bearing steel, bronze or aluminum in one piece in lengths from 12 feet to 100 feet and are tapered with Venetian entasis, having a smooth uninterrupted exterior surface throughout without visible joints or offsets. These poles are specially designed for memorials, monuments and buildings of exceptional architectural value. They are standardized but not carried in stock, being made to order only.

Swaged Sectional Flagpoles are fabricated in sections of copper-bearing steel pipe and standardized in lengths from 17 feet to 150 feet. Shop joints and field joints are made without the use of bolts, pins, rivets, screw couplings or lead calking. These poles are shipped in knocked-down sections with easy assembly at erection site, no tools other than an ordinary hammer and calking chisel being necessary to accomplish this work.

Equipoise Tilting Flagpoles are Swaged Sectional or Continuous Entasis Tapered steel poles in lengths from 20 feet to 40 feet, equipped with a counterbalanced arrangement which allows the pole to be lowered for repainting or installing halyards.

CATALOGS AND SERVICE

Catalogue and pamphlets giving full information, details and specifications, etc., will be gladly mailed on request.

Our Engineering Department will gladly assist you in planning your contemplated flagpole installations most satisfactorily and economically without obligation whatsoever.

MORSE BOULGER DESTRUCTOR COMPANY

202-B East 44th Street, New York, N. Y.

REPRESENTATIVES IN ALL PRINCIPAL CITIES

INCINERATION

Incineration is the answer to one of the serious problems of school administration presented by the increase in food service and the demand for higher standards of safety and sanitation.

It eliminates an unpleasant and dangerous nuisance—storage of odorous, germ-breeding garbage awaiting the collector. It removes a serious fire hazard—the accumulation of papers and rubbish, inviting the birth of small fires and encouraging the growth of great ones.

MORSE BOULGER DESTRUCTORS

Morse Boulger Destructors are designed to economically take care of the incineration requirements of each installation. Different types are used for the disposal of garbage, rubbish and combinations of garbage and rubbish. The proper type, capacity, method of charging and other details are determined only after a careful study of the requirements so that the operation will be economical and foolproof.

Special Destructors are built for the disposal of animal and human remains from anatomical laboratories in medical schools.

Every Morse Boulger Destructor carries a permanent guarantee to operate without nuisance from smoke and odors.

TYPICAL INSTALLATION

They are the product of a company which has been engaged for over thirty-seven years exclusively in the design and construction of incinerators. Hundreds of Destructors are in operation in all parts of the world burning almost every conceivable kind of waste.

COSTS

The operating costs of Morse Boulger Destructors are low, as economical use is made of the rubbish and commercial fuel for burning up the garbage or other wet materials. Only part time of one man is ordinarily needed for operation. The advantages of incineration can be had at costs often less than for disposal by other means.

Maintenance costs are low, for the Destructors are heavy-duty equipment—properly designed and ruggedly built of materials proven in the severe service of incineration.

NEW AND EXISTING BUILDINGS

Leading school architects are including incineration and specifying Morse Boulger Destructors in new projects. If you are planning a new school, a Morse Boulger Destructor should be shown on the plans.

Destructors can readily be installed in existing buildings at low cost as they are complete and independent of any other equipment.

Detailed information, dimensions, capacities and prices will be furnished on request.

GARBAGE AND RUBBISH DESTRUCTORS

New Jersey College for Women, New Brunswick, N. J.
Newcomb College, New Orleans, La.
Pennsylvania State College, State College, Pa.
Western Reserve University, Cleveland, Ohio
Holy Name College, Washington, D. C.
Sarah Lawrence College, Yonkers, N. Y.
Mt. St. Joseph College, Chestnut Hill, Pa.
St. Francis Xavier College, New York, N. Y.
Meharry Medical College, Nashville, Tenn.
Roosevelt High School, Altoona, Pa.
New Senior High School, Altoona, Pa.
Old Senior High School, Altoona, Pa.
White Plains High School, White Plains, N. Y.
Masters School, Dobbs Ferry, N. Y.
Taft School, Watertown, Conn.
St. Mary's Seminary, Baltimore, Md.
St. Charles' Seminary, Overbrook, Pa.

ANATOMICAL DESTRUCTORS

University of Pennsylvania, Philadelphia, Pa. (2)
University of Rochester, Rochester, N. Y.
Iowa State College, Ames, Iowa
Meharry Medical College, Nashville, Tenn.
Duke University, Durham, N. C.
University of Texas, Galveston, Texas

HEAVY-DUTY INCINERATION

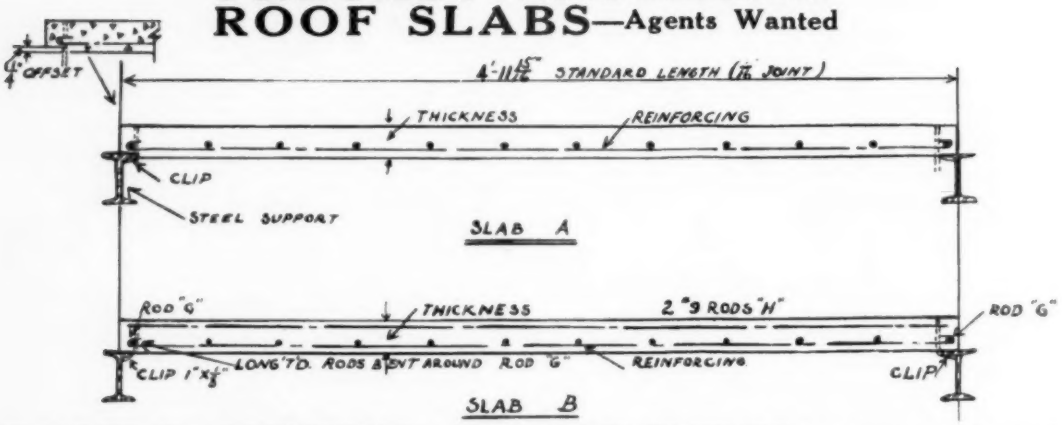
MORSE BOULGER DESTRUCTORS

Affiliated with Kerner Incinerator Company of Milwaukee
Originators and Largest Manufacturers of Flue-Fed Incinerators

NATIONAL "NAYLEGRIP" COMPANY, INC.

1721 Ash Street, Erie, Pennsylvania

PRECAST NAYLEGRIP ROOF SLABS—Agents Wanted



BONDO CEMENT COMPOSITION—Agents Wanted

An all mineral floor surfacing material composed of BONDO Portland Cement Silica or Granite filler, pure fast cement colors and dyes, treated with pure gum turpentine and special penetrating oils, producing a hard, well appearing, practical floor surface for schools, hospitals, showers, dance floors, etc. Also an excellent blackboard finish, see specifications.

N-A-I-L-B-O-N-D—Agents Wanted

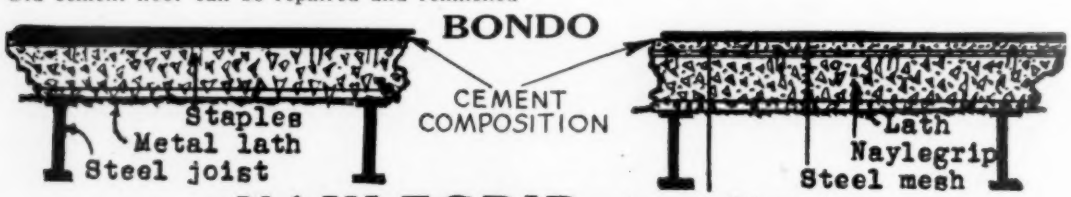
A Compound for making a Nailing Concrete

Because of its nailability, noncontraction and nonexpansion, is used as a sub-base for Bondo Cement Composition. See specifications. Also, as a sub-base to which wood floors may be nailed. It will not rot or come loose when properly nailed to Nailbond Concrete. It has a bearing under every square inch. Especially adaptable to ground floor installations. A dampproof glazing and special nails are furnished under our quotations, unless otherwise indicated. Tests and samples are furnished on request.

B-O-N-D-O—Agents Wanted

A National Naylegrip Co., Inc. Product
For making a Mineral Paint

Bonding new cement finish to old cement walls and floors. An excellent medium for lime cement plaster, crack filler, etc. Call us for instructions and prices. We may be of great service to you. Old cement floor can be repaired and refinished by the use of BONDO and at a minimum cost. Also used for resurfacing stucco, in paint form. Applied with brush, is excellent for refinishing and waterproofing stucco.



NAYLEGRIP—Agents Wanted

A Compound for making a Nailing Concrete

Noted for its nailability, lightweight insulating, etc. Is used as a sub-base on which to nail wood floors. Also, as an insulating sub-base for built-up roof decks, and compositions of various kinds. Also made in pre-cast roof slabs. We rent collapsible steel moulds for making pre-cast roof slabs on large jobs. Prices, test analyses, and samples can be furnished if required. Nails and glazing furnished with composition. Naylegrip Concrete has many engineering applications and is equal to any other make.

NATIONAL WOOD PRODUCTS COMPANY

Union Guardian Building
Detroit, Michigan

Manufacturers and Installers of

EVANITE—LAMINITE and EVERLEVEL Wood Block Flooring

EVANITE

EVANITE Wood Floor Tile is particularly recommended for the floors of classrooms, science rooms, lecture halls, libraries, auditoriums, etc., wherever it is desired to combine attractive appearance with long lived service under constant traffic.

Laid directly on concrete subfloors in Cushionite Mastic, which retains its elasticity indefinitely yet tenaciously secures the flooring to the base, EVANITE Wood Floor Tile is QUIET, SANITARY and Fire Resistant.

Specially milled from thoroughly air and kiln dried selected flat grain stock (not standard strip flooring stock) EVANITE consists of accurately machined, tongued and grooved strips joined with a special waterproof casein glue and two ⅜" hardwood dowels inserted entirely through each block, at right angles to the grain of the wood.

An unusual feature of EVANITE installations is a highly efficient spring expansion joint providing most complete protection against expansion and contraction in wood block floors.

LAMINITE

LAMINITE Fir Plywood Flooring is a unique flooring composed of alternate strips of end and edge grain laminations put together with waterproof glue, tongued and grooved and bored for lateral nailing resulting in a flooring that positively will not cup.

Manufactured from the largest and finest Douglas Fir logs, it has all the advantages of ordinary end grain flooring with the additional advantage of structural strength combined with fine appearance.

LAMINITE may be used in all parts of a school or college, but it is best adapted to those places subjected to heavy duty, such as gymnasiums, stages, auditoriums and manual training rooms.

Manufactured in eight foot strips and in thicknesses from 1 1/16" to 3½" LAMINITE flooring may be laid in any manner in which other types of flooring are laid. It may be applied in mastic directly on concrete subfloors, on sleepers, or nailed to wooden subfloors.

EVERLEVEL
End Grain Strip Wood Block Flooring

Applied in Cushionite Mastic directly on concrete subfloors, EVERLEVEL is an ideal floor for shops, receiving rooms and other places requiring the remarkably durable wearing surface of end grain wood combined with an insulating effect which reduces shop noises.

EVERLEVEL is available in either Port Orford Cedar or Douglas Fir in 2" or 2½" thicknesses. The individual end grain blocks are assembled into strips up to 8 feet in length by means of full length dowels. The strips are then completely secured into a single unit by tight fitting galvanized steel splines laid in continuous strips the entire length of the floor.

Genuine

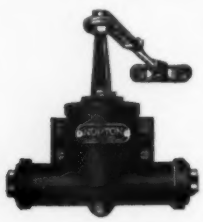
Norton Door Closers

are manufactured by the

NORTON DOOR CLOSER COMPANY

Division of The Yale & Towne Mfg. Co.

2900 North Western Ave.
Chicago, Ill.



Many of the outstanding schools in the country are fully equipped with Norton Door Closers. A few of the latest additions to this long list are Lane Technical High School and Wells Junior High School, Chicago, John Long, Jr. High School, Dallas, Texas, Woodrow Wilson Junior High School, Hamilton, Ohio, and many others. Norton Door Closers were chosen for these buildings because of their proper design, correct materials, careful workmanship, and unusually long life.

The rack and pinion principle has been used in Norton Door Closers for more than 25 years and has demonstrated its ability to control the doors during the entire closing swing. It greatly reduces the strain on the closer, the door, and the hinges. The present style of packing nut was designed after a long period of experimentation and testing. It is impossible for the liquid to creep up the shaft into the spring chamber because the capillary attraction is broken in the middle of the packing nut as shown at the right.

All interior moving parts are made of steel and are carefully cut and ground from solid steel bars. This gives great strength and much longer life. The springs are made of special analysis steel which is unusually flexible and powerful.

As every part goes through the factory, it is carefully inspected to see that every dimension is correct and that there are no flaws in the material. Every assembly operation is checked and the completed closer is tested to make sure it will perform properly on your door.

Norton Door Closers offer you many extra advantages at no extra cost. Ask for our catalog.

REPUBLIC STEEL CORPORATION

General Offices: Youngstown, Ohio

SALES OFFICES AND DISTRIBUTORS IN ALL LARGE CITIES

The fact that school and university buildings represent long-time investments running into many thousands of dollars makes the selection of pipe a decision of real responsibility.

Many of the newer schools, a few of which are illustrated below, are equipped with Toncan Iron Pipe in plumbing and heating systems. The selection of Toncan Iron in every case followed a thorough investigation of its qualities.

Toncan Iron is a highly refined open hearth iron with which are alloyed correct proportions of copper and molybdenum. Tests in the laboratory and in actual service have shown that it possesses the maximum rust-resistance of any ferrous material in its price class. This quality makes for longer, trouble-free life in all types of service in buildings, with a resulting economy hard to estimate, because repairs to inferior pipe can soon mount to almost unbelievably high figures.

Toncan Iron Pipe is easy to work—it bends, cuts and threads easily, the savings in fabrication and installation often more than offsetting its slightly higher cost.

TONCAN COPPER MO-LYB-DEN-UM IRON PIPE

It is made in standard, extra heavy and double extra heavy weights, black and galvanized. It can be used wherever pipe is required in air, gas, hot and cold water, steam mains and returns, drainage and vent lines, with highly satisfactory results.

Every length of Toncan Iron Pipe is painted blue and marked with the name Republic in raised letters. Couplings are blue and stamped RT.

Write for a copy of "Pipe for Permanence"—sixty-four pages of interesting money-saving information and facts about the remarkable performance of this rust-resisting pipe.

Toncan Iron Sheets—Toncan Iron is also available in sheet form. It is ideal for all exposed metal work—roofing, gutters, downspouts, ventilating ducts, etc. It is ductile, therefore easy to work. Its resistance to corrosion is uniform throughout the entire thickness of the sheet. Hundreds of installations are illustrated and described in "The Path to Permanence," a copy of which will be sent upon request.

We shall also be glad to send catalogs showing complete laboratory equipment made of Toncan Iron.

1. All pipe in the heating system of Rufus King High School, Milwaukee, Wis., is rust-resisting Toncan Iron.

2. Jones Bldg., University of Chicago—a Toncan Iron Pipe installation.

3. Ventilating hoods and ducts of Toncan Iron and Enduro Stainless Steel, New Chemical Bldg., State Teachers College, Murfreesboro, Tenn.

4. Typical piece of Toncan Iron Laboratory Furniture.

5. Toncan Iron Furniture in a research laboratory.

ROBBINS FLOORING COMPANY

Members M. F. M. A.—N. H. F. C.

Manufacturers of

NORTHERN HARD MAPLE, BIRCH AND WISCONSIN OAK FLOORING
"IRONBOUND" WOOD BLOCKS AND STRIPS, PARQUETRY

Mills: Rhinelander, Wis
Newberry, Mich.

Rhinelander, Wisconsin

PRODUCTS

ROBBINS Hard Maple, Birch and Wisconsin Oak Strip Flooring, Bowling Alley and Squash Court Maple, Individual Piece Blocks for Laying in Mastic. "IRONBOUND" Unit and Continuous Strip Blox. Special Flooring Items made to order.

FEATURES

Exceptional Durability.
Smooth, non-slippery surface.
Beauty in color and texture, restful appearance.
Moderate initial cost, low maintenance outlay.
Warmth, foot-comfort, resilience.
High sanitary qualities.

ROBBINS HARD MAPLE FLOORING, STRIP TYPE, WAS SELECTED BY THE MINNEAPOLIS SCHOOL BOARD FOR THIS SCHOOL. RAMSEY JUNIOR HIGH, MINNEAPOLIS, MINN.
Minneapolis School Board, Architects; Midwest Contracting Company, Minneapolis, Minnesota, Contractors

STRIP FLOORING

ROBBINS Strip Flooring is Nature's ideal product—grown and processed in Upper Michigan and Wisconsin, "M. F. M. A." graded from properly seasoned, kiln dried lumber, made in all standard sizes and grades from 3/8" x 1½" to 53/32" x 3¼" face width. Specified many years for laying on sleeper construction for nailing.

BLOCK FLOORING

Herringbone Single Piece Blocks are made with flat backs and special grooves for laying in mastic. Each piece supported by six adjoining pieces. A strongly-built, practical floor, fully able to withstand the rigorous treatment given school room floors.

"IRONBOUND" Unit Blox are assembled in squares, rectangles and panels, the entire floor interlocked with saw-tooth steel splines. A most substantial attractive school room floor. By test the best constructed unit block in existence.

"IRONBOUND" Continuous Strip Blox are of uniform length, laid in straight courses, tied in with long steel splines, making the strongest, most durable wood floor known. Combines the simplicity of strip flooring with the uniformity of parquet.

All ROBBINS mastic-set floors are absolutely squeak-proof, non-resonant, more fire resistant than other types, chemically treated to prevent vermin attack.

PARTIAL LIST OF EDUCATIONAL BUILDINGS USING ROBBINS FLOORING

Princeton University, Princeton, N. J.
Penn State University, State College, Pa.
Fordham University, New York City
Vassar College, Poughkeepsie, N. Y.
Amherst College, Amherst, Mass.
Women's College, San Francisco, Calif.
J. E. Burke High School, Boston, Mass.
Walton High School, New York City
24 Grade and High Schools, Long Island, N. Y.
Pocantico Hills School, Pocantico Hills, N. Y.
Grant Union High School, San Francisco, Calif.
Arlington School, Lexington, Ky.
Grade and High School, Burlington, Iowa
High School, Inverness, Mont.
Grade and High Schools, Oklahoma City, Okla.
Schools at Fredonia, Kans., Carys Brook, Va., Terre Haute, Ind., Ottumwa, Iowa, Mt. Grove, Mo.
Grammar School, West Point, N. Y.
Virginia State College for Negroes, Petersburg, Va.

Because of its well earned reputation for quality and uniformly fine workmanship, ROBBINS Flooring is specified by architects for more educational buildings than any other brand of hardwood flooring. **Write for our new 44 page brochure, "Late American Floors,"—a comprehensive, concise, discussion of mastic-set wood floors, designed to aid architects, engineers and school executives.**

INSTALLATION OF BLOCK TYPE MAPLE, VOCATIONAL SCHOOL, MANITOWOC, WISCONSIN
Wm. Raeuber, Architect; Schuette Construction Company, Contractors

THE SAFE TREAD COMPANY

Manufacturers of

The Improved Abrasive Metal
—"SAFE TREAD"—

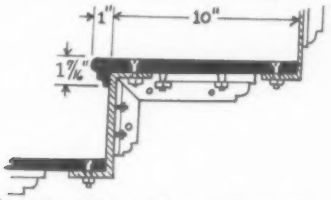
(Listed by the Underwriters Laboratories)

IRON — BRONZE — ALUMINUM

220 Broadway, New York City

AGENTS IN ALL PRINCIPAL CITIES

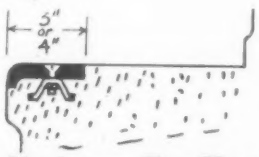
The necessity of providing slip-proof walkways for the safety of children and teachers has been established by the courts.



Style N5—For New Construction

Maintenance costs are likewise of utmost importance.

The use of "Safe Tread" Stairtreads—Door Sills, Platforms, Landings, etc., for new construction or repairs to existing walkways will insure the highest degree of **Nonslip** qualities and the greatest amount of **wearability.**

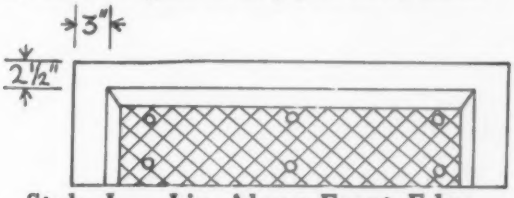


Style XL Nosings—For New Concrete

When Ordering or Requesting Quotation

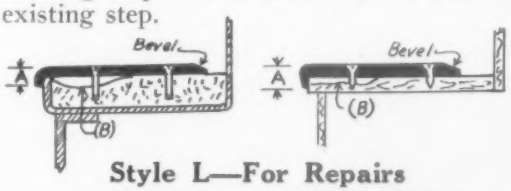
Specify iron, bronze or aluminum Safe-tread—style nosing desired, width overall or back of nosing, length, surface design (see below), quantity of each size. If unusual shapes are required furnish detail sketch or template. If for repairs advise what type material is being covered.

Submit your walkway problems to us, we shall be glad to help you solve them.



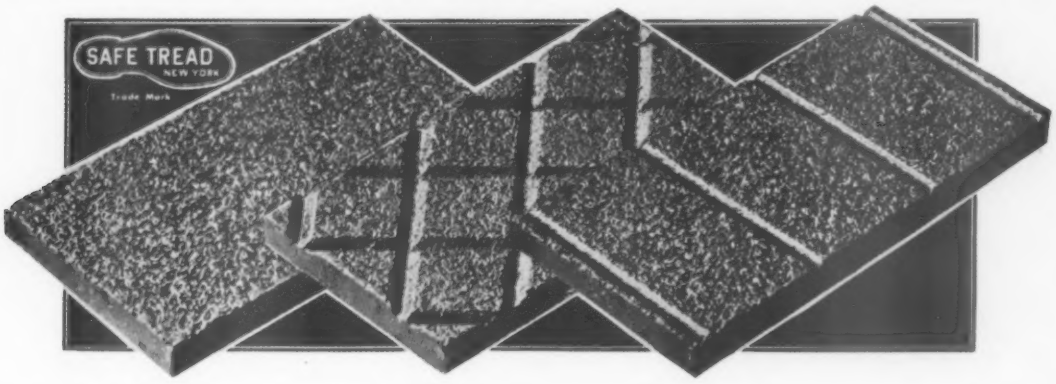
Style L— Lip Along Front Edge, Beveled Backs and Ends

Recommended practice for repairs carry new tread to within 2½" of back edge of existing step and to within 3" of side of existing step.



Style L—For Repairs

	CONCRETE OR PAN FILLED	WOOD, MARBLE OR STONE
(A)	¼", ½", ¾", 1" or 1½", whichever required to cover worn area.	
(B)	Fill worn spots with cement before putting new treads in place. Secure with lead sleeves and wood screws.	



AIA File 31-i-13

SCHWARZE ELECTRIC COMPANY

Special and General Service Sound Signals and Accessories

Adrian, Michigan

ESTABLISHED 1904 — OFFICES IN PRINCIPAL CITIES

PRODUCTS

Bells, Buzzers, Horns, Sirens, Kode-Kall.

CHARACTERISTICS

Instantaneously responsive, clear sounding, distinct. Built to highest electrical and mechanical standards for utmost dependability.

USES

Program clock, code paging, fire alarm and general signaling systems.

FINISH

Bodies: regular, black; fire duty, red. Gongs: Special Steel (nickel plated, parkerized black or udylite) and Cast Bell Metal (lacquered).

Descriptive bulletins on request

FAMOUS "CYCLONE" VIBRATING BELLS

For class rooms, corridors, yard and general service.

COMMON FEATURES—Regularly weatherproof; cast iron frames; plunger type; loud, even ringing; surface, conduit or outlet box mounting.

NO. 700 SERIES—A.C. only. Non-contact; polarized, 6-volts and higher, 25 or 60 cycles; parallel or series circuits. Gong sizes 3″ to 12″.

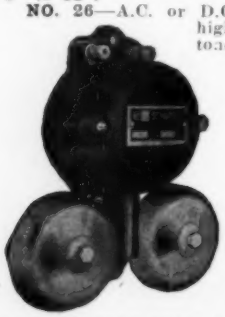
NO. 6-F—D.C. only. 4 volts and higher. Parallel circuits only. Gong sizes 6″ to 12″.

SINGLE STROKE BELLS

For code signaling, fire alarm, etc.

NO. 37—A.C. or D.C. 6 volts and higher. Series or parallel circuits. Cast iron frames, weatherproof, plunger type. Surface, conduit or outlet box mounting. Specify 37-A for A.C.; 37-D for D.C. Gong sizes 3″ to 12″.

NO. 26—A.C. or D.C. Monitor type. 6 volts and higher. 3″ Bell Metal Gong, soft toned. Interior use only.



DOUBLE GONG BELLS

For class rooms, corridors and general service.

NOS. 9 and 11—A.C. only. 6 volts and higher. Gong sizes 2½″ to 10″.

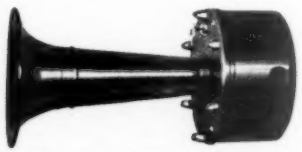
NO. 35—D.C. only. Up to 40 volts. Gong sizes 2½″ to 4″.

NOS. 22 and 23—D.C. only. Up to 30 volts. Gong sizes 6″ to 12″.

MANFINDING KODE-KALL

A simple, inexpensive, dependable, automatic paging system for schools, dormitories, libraries, institutions, etc. Sounds 30 different code signals. Repeats signals three times. Easy to install. Special bulletin on request.

ALL PURPOSE VIBRATOR HORNS



For fire alarm, code signaling and general service.

TYPES 18 and 3.

COMMON FEATURES—Weatherproof or non-weatherproof; instantaneously responsive, clear sounding, distinct; surface, conduit or outlet box mounting; projectorless, megaphone or 2-directional projectors. 5½″ diaphragm. OPTIONAL FINISHES—Regular, black; fire duty, red.

TYPE 18—A.C. only (50-60 cycles). Up to 220 volts. Contactless, synchronous vibrator; outside tone adjustment; Series or parallel circuits. For outdoor use, specify 18-WP.

TYPE 3—A.C. (25-40 cycles) or D.C. up to 220 volts. Parallel circuits only. Heavy duty tungsten contacts. Specify 3-A for A.C.; 3-D for D.C.; 3-WP (A or D) for outdoor use.

TYPE 60 GIANT VIBRATOR—A.C. only. 110 or 220 volts (50-60 cycles). Powerful, penetrating. Weatherproof. ½″ tapped conduit connection. FINISH: black or red. 6¼″ diaphragm.

TYPE 2—A.C. and D.C. Up to 110 volts. Non-weatherproof, megaphone style black finish only. Specify 2-A for A.C.; 2-D for D.C. 3½″ diaphragm.

TYPE 150 WEATHERPROOF SIREN

A.C. or D.C. up to 250 volts. For fire or any emergency signaling purpose. High speed, ball bearing motor. Instantaneously responsive, powerful, penetrating. Integral terminal box with ½″ tapped conduit connection. Tilting bracket. Finish, red. Special bulletin on request.

MISCELLANEOUS

Light and heavy duty buzzers; light and intermediate duty bells; non-electric, hand-trip bells; protective housings; gong guards; hanger plates; wood mats; break glass stations; concealed bell-buzzer combinations; transformers; relays, etc.

THE SIMS COMPANY

Storage Type Water Heaters

ERIE, PENNSYLVANIA

"We Keep Others in Hot Water"

Hot Water in Abundant Supply is of first importance in public school and college buildings. Hot water in excess of maximum demand is better than just enough, or too little, in both quantity and temperature. Be liberal, and avoid complaint.

Sims "J" Type Water Heaters are designed to meet a wide range of service, for water heating purposes, covering every possible demand except the furnishing of hot water for domestic use in the individual home. "J" Heaters are water tube type: water in the tubes, steam in the shell. The tubes are ¾" 17 BWG seamless drawn copper, mill tested at 1000 pounds pressure; bent U-shape by a process which does not distort the tube, both ends being expanded into a heavy forged steel tube plate. A lead tube support and spacer keeps the tubes in perfect alignment and prevents sagging.

Swimming Pool Heaters always operate under forced circulation and in large volume; the temperature is low, requiring a comparatively small amount of heating surface. Tubes in pool heaters are arranged in two passes, giving ample area for the volume of water being circulated. These heaters may be installed either vertical or horizontal.

General Service Heaters, Instantaneous and Forced Circulation

When the steam supply is constant and ample to meet the peak demand, this type of heater can be used to advantage; steam is used only when water is being drawn. When installed in connection with a two-pipe or return circulation system, hot water is available instantly at every faucet. Water storage is not necessary with this installation. (Either vertical or horizontal.)

General Service Heaters—Instantaneous Gravity Circulation

This four-pass heater is designed for use in connection with a two-pipe or return circulation hot water system, hot water being available instantly at every faucet at a maximum temperature of 140 degrees.

Maintaining a Reserve Supply

To meet the peak demand in every water heating system, a reserve supply must be provided—either in boiler capacity or in storage of hot water. When the steam supply is limited, water storage is necessary—not less than 50 per cent of the peak hourly demand. This service can be taken care of either with a storage tank containing a steam tube element, or with a storage tank and separate water heating unit.

Special Construction

For steam or water pressures higher than 100 pounds, for service requiring bronze tube plates, composition or special tubes, or other combinations, special quotations will be figured to meet definite specifications.

Write for illustrated booklet giving Architectural and Engineering Data on SIMS Type "J" Water Heaters and Storage Heaters (see illustration).

With "U" Tubes

STEEL AND TUBES, INCORPORATED

World's Largest Producer of Electrically Welded Tubing

Cleveland, Ohio

Subsidiary of Republic Steel Corporation

ELECTRUNITE

(Reg. U. S. Pat. Off.)

Steeltubes

Electrunite Steeltubes—the modern threadless rigid conduit—is well known to the electrical wiring industry. For several years, this electric resistance welded electrical metallic tubing has found favor because of its lighter weight, its elimination of threading, its ease of cutting, bending and re-bending, and its speed of installation. Three simple fittings adapt it to any job.

A recent improvement in design—a new knurled inside surface—has shown in actual test that it saves approximately 30% in wire pulling effort. The new finish lifts the cable away from the wall of the conduit, so that, instead of being in continuous contact with the wall, the cable travels over the tops of tiny rounded knobs that look and act like the tops of ball bearings. With the new finish, longer runs can be pulled with greater ease, and cable can be pushed through short runs with less tendency to jam.

Electrunite Steeltubes Conduit offers full electrical and mechanical protection. It is approved by the National Electrical Code and for Government work. It may be used for all open and concealed wiring (except in cinder fill), for service conductors on exterior building walls and entering buildings, for voltages up to 600, and with conductors up to No. 4. Sales records prove the wide acceptance of Steeltubes—more than 50,000,000 feet installed.

Electrunite Steeltubes is available in sizes ⅜" to 2", inclusive. Sizes ½", ¾" and 1" are available with the new knurled inside surface. Stocked by electrical supply houses in all large jobbing centers. Write for literature.

ELECTRUNITE

REG. U.S. PAT. OFF.

STEEL & TUBES ELECTRIC WELD

BOILER TUBES

A modern type of boiler tube of steel or rust-resisting Toncan Iron, made by electrical resistance welding under the Johnston patents owned by Steel and Tubes, Inc.—a proved process by which more than a billion feet of tubing has been made for countless purposes during past years.

Because Electrunite Boiler Tubes are made from clean, flat-rolled metal, formed cold to a perfect round, they possess a uniformity in diameter, wall thickness and concentricity not attained in tubes made by other processes.

Due to the mechanically-controlled electrical resistance method employed in welding, the weld is as strong as the wall. Tubes are full-normalize-annealed, soft, ductile and of uniform grain structure. Every tube is tested at pressures far in excess of code requirements. Electrunite Boiler Tubes, because of these qualities, make possible tighter joints with worth-while savings in time and labor. Users report savings of 15 to 20 per cent in installation costs.

Because the tube surface is smooth and free from scale, corrosion and pitting action are retarded and the tubes last longer.

Electrunite Boiler Tubes meet requirements of A. S. M. E.; U. S. Dept. of Commerce, Steamboat Inspection Service; American Bureau of Shipping. They can be used in either fire-tube or water-tube boilers requiring either straight or bent tubes.

Electrunite steel and rust-resisting Toncan Iron Boiler Tubes are carried in stock in Cleveland by Steel and Tubes, Inc., and by distributors in many cities. Write for literature.

THERMAX

DIVISION NORTHWEST MAGNESITE COMPANY

Farmers Bank Building
Pittsburgh, Pa.

PRODUCTS

Thermax Insulation, partition blocks, furring and roof slabs.

Absorbex Acoustical Corrective.

THERMAX PARTITIONS

Thermax Partitions are fireproof, highly soundproof and earthquake proof. They are light in weight, economically erected, and offer a true surface and excellent bonding key for plaster or stucco.

Thermax is also used in connection with reinforced concrete floor construction forming; sound-deadening plaster base, and for suspended ceiling construction and sound insulation of ducts in connection with air-conditioning systems.

Sizes: 1″ x 20″ x 64″
2″ x 20″ x 64″
3″ x 20″ x 64″
or 32″

Insulation Value—.46 B.t.u. per inch

Sound Deadening Value—35 to 47D6 reduction

Weight—2.2 lbs. per sq. ft. per inch thickness

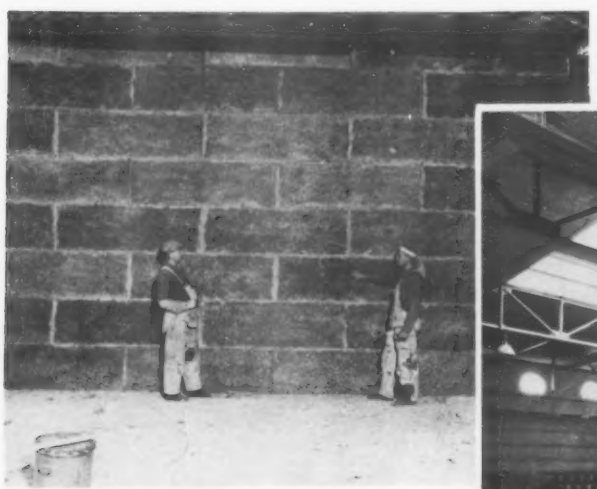
ABSORBEX ACOUSTICAL CORRECTIVE

Absorbex is non-inflammable, and can be repainted many times without affecting its sound absorbing qualities—is permanent and decorative.

Absorbex has been tested by the official laboratories of the Acoustical Materials Association, and is listed in the Association literature as having high absorption coefficients.

Absorbex is particularly adaptable to auditoriums, gymnasiums, cafeterias, offices, corridors and classrooms. It is installed by approved contractors skilled in the technique of application and with thorough knowledge of the engineering principles as applied to architectural acoustics and sound insulation.

See Sweet's Architectural Catalog or write THERMAX, Farmers Bank Building, Pittsburgh, for complete details.



THERMAX PARTITIONS
FIRE AND EARTHQUAKE PROOF

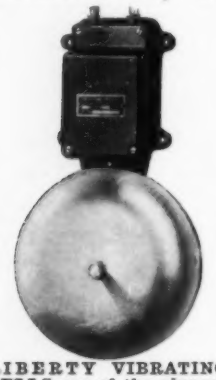
ABSORBEX ACOUSTICAL CORRECTIVE
INCOMBUSTIBLE AND PERMANENT

THE THOMAS-SMITH COMPANY

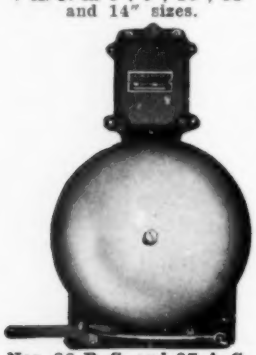
Canton, Ohio

BRANCHES IN PRINCIPAL CITIES

Electrically and Mechanically Operated Fire Alarm Systems
Electric Bells and Signals



LIBERTY VIBRATING BELLS are of the plunger hammer type. Nos. 6-Jr. D. C. and 7-Jr. A. C. are made in 3", 4", 5" and 6" sizes, and Nos. 6 D. C. and 7 A. C. in 6", 8", 10", 12" and 14" sizes.



Nos. 86 D. C. and 87 A. C. Combination Vibrating and Mechanical Bells are especially adapted for fire signals. They are made in 8", 10" and 12" sizes.

Nos. 811 D. C. and 812 A. C. Combination Single Stroke and Mechanical Bells are also adapted for fire signals. They are made in 6", 8", 10" and 12" sizes.

PRODUCTS

Manually Operated Fire Alarm Systems;

Electrically and Mechanically Operated Fire Alarm Systems;

Vibrating and Single Stroke Bells for Direct or Alternating Current;

Combination Electrical and Mechanical Bells;

Aluminum Grids to fit all sizes of bells;

Steel housings for all sizes of bells.

THOMAS-SMITH FIRE ALARM SYSTEM FOR SCHOOLS

(Illustrated at Right)

This manual fire alarm system for schools is approved by architects and conforms with state codes. It is the only system having a rigid rod connecting the alarms on the different floors of the school buildings. Other constructive features are:

1. Supports are adjustable to take care of uneven walls or misalignment of succeeding floors.
2. The floor tube is adjustable, to allow for floors of various thicknesses, and it extends up from the floor to prevent any obstruction in operation.
3. The spring is totally enclosed and positive in action.
4. All supports and tubes are bushed with brass, lacquered.
5. Finish is enamel. Colors, red, black or buff.
6. The bells are the best made.
7. The handles are of polished brass, lacquered.
8. The operating rod is a continuous steel tube, operating gongs on all floors simultaneously.
9. Wood mats are supplied for mounting supports and gongs.

Combination electrical and mechanical bells can be furnished with above fire alarm systems for operation wtih electrical ringing systems.

THOMAS-SMITH LIBERTY BELLS

Thomas-Smith Liberty Bells cover all types and sizes from 4-inch to 20-inch, vibrating or single stroke, 110 volt, 220 volt, all standard transformer voltages, battery operations, direct or alternating current. Weatherproofed types are furnished if desired at a small additional cost. All Thomas-Smith Liberty Bells embody the very finest workmanship and materials. Thomas-Smith Aluminum Grids are made to fit all sizes of bells. They fit snugly at the base of the mechanism over the shell and are bird-proof.

Write for catalog of Thomas-Smith Fire Alarm Systems and Liberty Bells.

LIBERTY SINGLE STROKE BELLS, Nos. 12 A. C. and 11 D. C. Made in 5" to 14" sizes. Bells contain no springs nor moving parts except plunger.

WARREN TELECHRON COMPANY

Manufacturers of Telechron Timekeeping Equipment

GENERAL OFFICE AND FACTORY
Ashland, Mass.

DISTRIBUTORS AND REPRESENTATIVES IN PRINCIPAL CITIES
In Canada: Canadian General Electric Company, Ltd., Toronto, Ont.

Telechron
TRADE-MARK

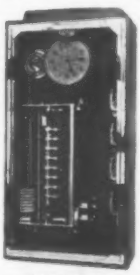
DOUBLE-FACE METAL CASE WALL MODEL

The Modern Timekeeping System for Schools

Telechron timekeeping equipment for schools includes classroom clocks, program instruments, combination signal control boards, signal equipment and central control equipment for system installations.

All Telechron clocks are complete individual timekeepers and can be installed as individual devices or in a system on a separate wiring circuit.

All equipment operates directly from the 110 volt a.c. lighting current, the frequency of which directly controls their accuracy; . . . eliminating local master clocks with their regulating, winding and cleaning problems.* 110 volt current operation practically eliminates line losses and wiring problems; powerful self-starting individual synchronous motor-drive in each device eliminates scattering; unaffected by dust, dirt or vibration; no batteries to service or replace; no clock relay complications. The largest single clock installation in the world operating from a single source of power is Telechron!



PROGRAM CLOCK FOR OPERATING CLASSROOM, CORRIDOR AND OUTDOOR SIGNALS

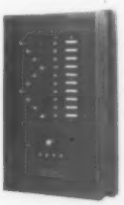
ROUND METAL CASE CLASSROOM TELECHRON

* By means of a Telechron Master Clock installed in the local power company station, regulated frequency is available for the accurate operation of Telechron timekeeping equipment.

COMPLETE SPECIFICATIONS AND RECOMMENDATIONS TO COVER YOUR PARTICULAR REQUIREMENTS WILL BE SUPPLIED BY YOUR LOCAL TELECHRON DISTRIBUTOR OR BY THE FACTORY . . . NO OBLIGATION

MARBLE CLOCK FOR AUDITORIUM, FOYER, ETC.

AUTOMATIC RESETTING DEVICE FOR CONTROLLING ADMR (Automatic Dual Motor Resetting) CLOCK SYSTEM



COMBINATION SIGNAL CONTROL BOARD FOR INDIVIDUAL CLASSROOM SIGNAL CONTROL

** Telechron is the trade-mark, registered in U. S. Patent Office, of Warren Telechron Company.*

THE NEW SAINT MARY ACADEMY BUILDING, MONROE, MICH. THE TELECHRON CLOCK INSTALLATION IN THIS BUILDING, THE MOTHER HOUSE, AND DINING HALL INVOLVES A TELECHRON ADFR SYSTEM CONSISTING OF 83 SECONDARY CLOCKS, ONE PROGRAM CLOCK AND CENTRAL CONTROL EQUIPMENT. D. A. BOHLEN & SONS, ARCHITECTS, DETROIT, MICHIGAN

THE WESTERN SHADE CLOTH CO.

General Offices and Factories: Cermak Road at Jefferson St., Chicago, Ill.

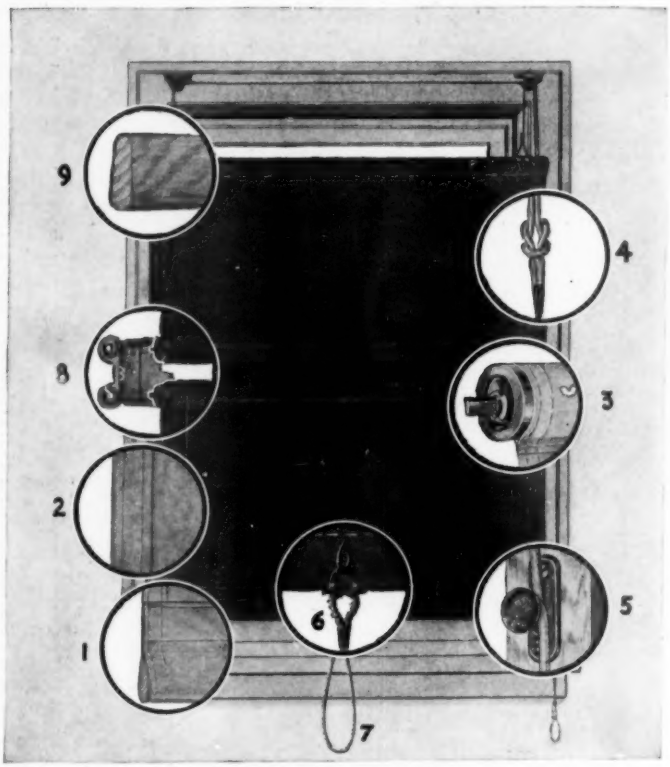
Atlanta Buffalo Indianapolis Detroit St. Louis Omaha Columbus Pittsburgh Indianapolis

"DIPLOMA"

Window Shade Equipment

15 SUPERIOR FEATURES

1. **EXTENSION HEM.** Lower sash shades have 1 inch extended hem as protection against damage when grasping.
2. **REINFORCED HEM.** A narrow shade cloth strip stitched along edges for a distance of four inches above the hem serves as a protection against tearing.
3. **ROLLER SLEEVE.** On down rolling shades the rollers are inserted in a special sleeve and stapled. Prevents tearing from roller.
4. **CONTROL CORD** is adjustable to take up slack.
5. **CORD CLEAT** on lower casing provides firm lock for operating cord.
6. **SNAP-ON FASTENERS.** Eliminate eyelets which weaken the slats.
7. **GLAZED CORD.** Extra heavy stretch resistant cord. Smooth and sanitary.
8. **LIGHT STRIP.** Ribbed, telescoping light strip with attached brackets. Shades cannot jump out.
9. **HEAVY SLATS.** Large size 1¼ in. best grade straight grained white pine.
10. **STAPLES** at each side of hems prevent pulling away.
11. **"STANDARD" ROLLERS.** 1 inch minimum size. Guaranteed.
12. **LOOPED CORD ENDS.** Clinched with metal fasteners. No unsightly knots.
13. **TWO-POINT SUSPENSION.** Upper shades have two-point suspension for ease of operation and to equalize the strain on the slat and fabric.
14. **PULLEYS.** Smooth running and sturdy.
15. **BRONZE FINISH.** All hardware, including roller ends, is of attractive rust proof bronze finish.



"Diploma" Window Shade equipment has no equal. Months of careful study have been spent in its development. Every detail has been carefully worked out to correct some specific weakness common to window shade equipment of the past. So simple that children can safely operate it. Entirely "fool-proof"—there is nothing to get out of order. We believe this to be the most important development in window shade equipment in recent years and feel that in it we have successfully met all the problems that for years have proven a constant source of trouble in the school room.

Manufacturers also of the following school needs:

Motion Picture Screens—

Book Binding Fabrics

Write for further information.

WHITE PINE SASH CO.

Spokane, Washington

Quantity Producers of White Pine Sash and Frames

DALMO-PINECRAFT MULTIPLE-OPERATING WINDOWS

Full-Vision Awning-Type Windows

DAYLIGHT illumination without glare, and natural ventilation without drafts (the outstanding features of awning-type windows) combine with the countless advantages of windows-of-wood when you specify DALMO-PINECRAFT.

This multiple-operating "Automatic" is a factory-assembled triple-sash wood window, all sash operated in unison by motion of the lower sash. Opened to a predetermined position, the lower sash disconnects automatically for independent operation, leaving the upper vents in fixed open position.

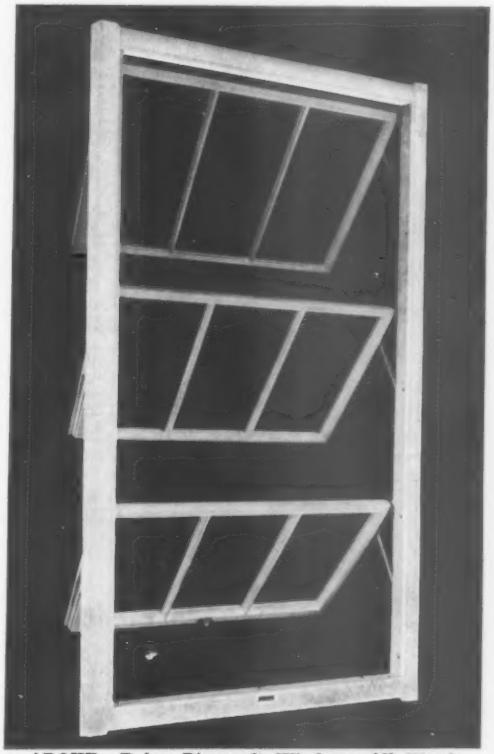
Re-connection of the lower sash is also automatic. Without the use of hand-operated clutches, the three vents can be set to admit fresh air, and at the same time to deflect disagreeable winds.

Equally simple is the method of controlling illumination. Shades attached to the lower edge of each vent operate individually to shut out direct rays of the sun, without affecting favorable light or interfering with ventilation. Cleaning or reglazing from the inside is both simple and economical.

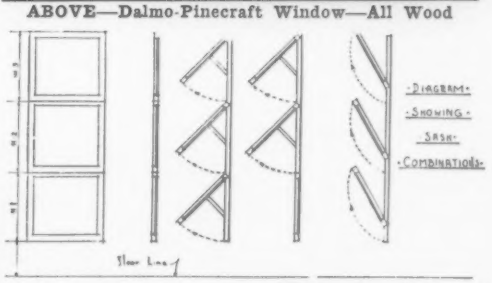
DALMO-PINECRAFT windows-of-wood resist the corrosion so often fatal to metal, they offer greater protection against infiltration of air and dust and they blend readily with any type of architecture. They are ready to install without special tools or factory supervision.

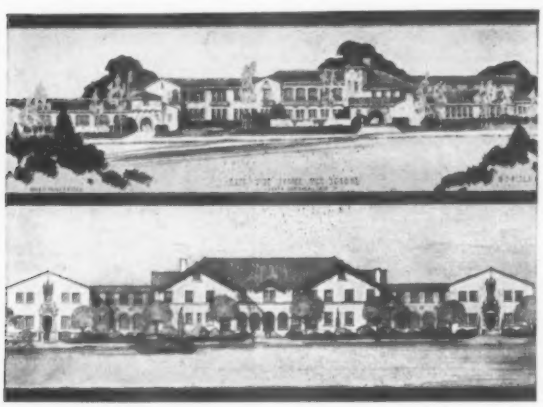
Weatherstripping

PINECRAFT Spring Bronze weatherstrip can be furnished where specified, each window being individually fitted and the strips permanently attached at the factory.



ABOVE—Dalmo-Pinecraft Window—All Wood





LEFT TOP PHOTO. East Side Junior High School, Santa Barbara, Cal. (W. H. WEEKS, Architect), is one of 1000 schools using DALMO windows.

THE LOWER PICTURE is the Marin County Infirmary, Marin County, Cal., S. HEIMAN, Architect.

Write for full-size details and Architect's specifications.

DALMO

Since 1912

PINE CRAFT

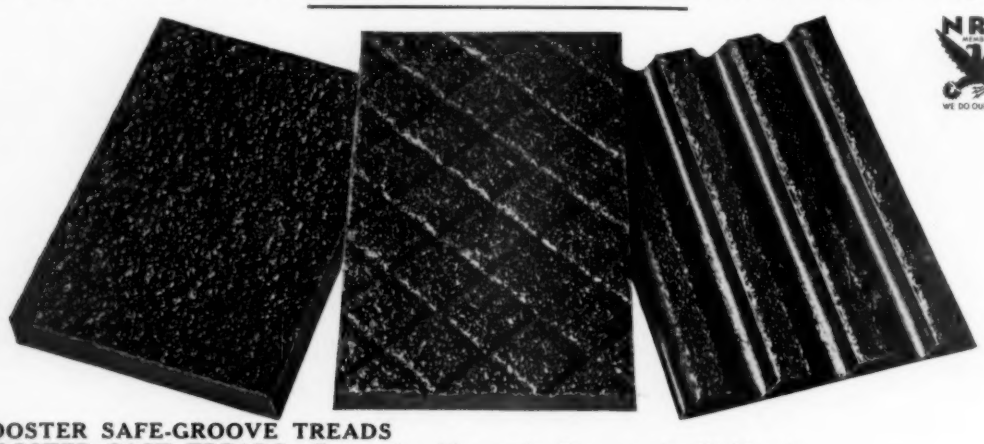
WHITE PINE SASH CO.

SPOKANE

WOOSTER PRODUCTS INC.

Wooster, Ohio

New York Office: 101 Park Ave. Chicago Office: 803 Transportation Bldg.



WOOSTER SAFE-GROOVE TREADS
WOOSTER CAST TREADS—Ferrogrit, Alumogrit, Bronzogrit, Nicklogrit

Stairs Must Be Safe

Stairs with slippery steel nosings or with hollowed out spots are dangerous to hurrying, careless feet. A slippery metal nosing is particularly dangerous to descending traffic; hollowed out spots invite falls and turned ankles regardless of direction of traffic.

Wooster Treads eliminate, not only the hazards of tripping and falling but further wear on original stair material. They prolong indefinitely the effective life of the supporting stair. When stair traffic is sufficiently heavy to wear out the safety treads after a long period of time, they can be replaced at a fraction of the cost of replacing the original stair structure.

Treads for New Construction

The grooved type tread shown at the right above is particularly adapted to new sheet pan stairs, concrete or wood construction. The cast treads (with abrasive grits embedded in wearing surface), either cross-hatched or plain surface, are used with self-supporting type of stair, or as a safety tread placed over other sub-treads.

Wooster Safe-Groove Treads can be furnished in steel, brass or aluminum base, with abrasive grits or lead anti-slip filler, in a number of different widths and sections.

Wooster Cast Treads are made of cast iron, cast aluminum, cast bronze or cast nickelbronze, having the abrasive grits embedded at the time of casting to provide a slip-proof surface and unusually durable material. Several styles of nosings are available and sizes are variable according to requirements.

Either type is easily and readily installed on present worn stairs. Installation information and cost estimates furnished upon request.

Wooster Security Nosing

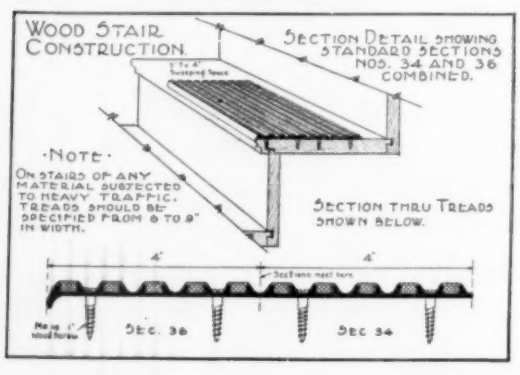
When used with floor coverings on stairs, it protects the edges and prolongs the life and appearance of the material indefinitely. Also widely used with linoleum or rubber for covering table, counter or desk tops subjected to hard usage. Made of solid, extruded Yellow Brass or White Alloy Metal. Easy to install; highly resistant to acid or chemical stains.

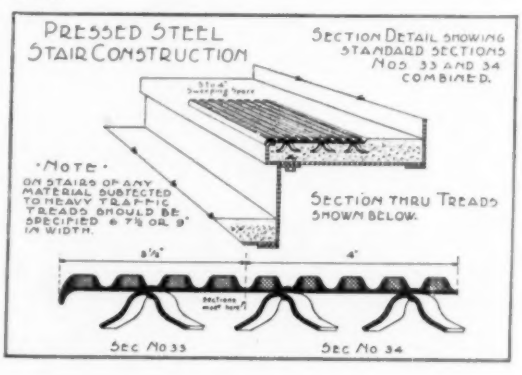
Wooster Security Edging

For protection of edges of rugs and runners of linoleum, rubber, etc., in classrooms, dormitories, halls and corridors. May be used with same materials in renovizing tops of tables, desks, cafeteria counters, etc. Made of solid extruded Yellow Brass or White Alloy Metal. Highly resistant to acid or chemical stains.

Wooster Metal Wall Trim

Used with flexible or rigid wall covering materials of linoleum, rubber or asbestos tile, plywood or hardboards for renovizing walls in dormitories, classrooms, offices, auditoriums, cafeterias, kitchens, bathrooms. Made of solid White Alloy Metal, a strong, heat-treated aluminum alloy. Standard finish is Woosterlite, a brilliant, mirror-like surface resembling chromium, or a satin finish of silvery white. Also available in seven colors.


WOOD STAIR CONSTRUCTION
SECTION DETAIL SHOWING STANDARD SECTIONS NOS. 34 AND 36 COMBINED.
·NOTE·
ON STAIRS OF ANY MATERIAL SUBJECTED TO HEAVY TRAFFIC, TREADS SHOULD BE SPECIFIED FROM 6 TO 9" IN WIDTH.
SECTION THRU TREADS SHOWN BELOW.
4"
4"
SEC. 36
SEC 34


PRESSED STEEL STAIR CONSTRUCTION
SECTION DETAIL SHOWING STANDARD SECTIONS NOS 33 AND 34 COMBINED.
·NOTE·
ON STAIRS OF ANY MATERIAL SUBJECTED TO HEAVY TRAFFIC TREADS SHOULD BE SPECIFIED 6 TO 9" IN WIDTH.
SECTION THRU TREADS SHOWN BELOW.
4"
SEC NO 33
SEC NO 34

OPERATION AND MAINTENANCE

Taking the School Inventory, and Accounting for School Supplies in Small Schools

BY F. E. HENZLIK
UNIVERSITY OF NEBRASKA

THE significance of taking a school inventory or carefully accounting for school supplies is not fully appreciated by those in charge of small city and village schools, or, indeed, by school people in general.

In a recent study less than 10 per cent of 85 school systems in Nebraska gave evidence of a systematic inventory of supplies or equipment.[1] Data available on the same point from other states indicate the same situation.[2] On the other hand, well-organized business has for many years deemed it not only desirable but necessary to secure the information revealed by a careful and systematic inventory. Indifference on the part of superintendents and other school officials in this respect leads to unbusinesslike attitudes, public suspicion, and lack of confidence in the administration and management of the school.

No one thing will do more to dignify and prove the worth of management than the careful and accurate accounting for the supplies and movable property of the school district. A proper inventory not only prevents the loss of property and supplies through theft and misplacement but aids in a number of ways; namely, (1) detects and focuses attention on waste and extravagance; (2) stimulates systematic, careful, and consistent purchasing; (3) furnishes information by which an accurate estimate can be made of depreciation and cost; (4) furnishes facts which can be used in long-time planning and the evaluation of new functions; (5) increases the recognition and appreciation of the responsibility on the part of school officials to the school and community in properly accounting for all forms of school property.

Linn stresses the significance of taking an inventory at least once a year and then lists the following ten values of an inventory:

1. It has a moral effect in persuading school employees and others to refrain from stealing equipment and supplies, if they are inclined to be dishonest.
2. Losses are discovered which investigation may recover.
3. Temporary loans of property to individuals and outside organizations are not so likely to be overlooked and forgotten.
4. Needless duplications may be avoided by transferring surplus equipment and supplies where needed.
5. A smaller stock of supplies and equipment can be carried in the storeroom or warehouse.
6. A more definite responsibility for the care and custody of school property can be fixed.
7. School employees may be more economical and careful when they know they are directly responsible for the equipment and supplies in their departments.
8. Equipment and supplies are not so likely to be transferred, misplaced, or forgotten.
9. If the inventories indicate money values, the

[1] Willard C. Jackman: "A Plan for Distribution of School Supplies in Small Schools." A thesis presented to the Faculty of the Graduate College of the University of Nebraska in partial fulfillment of the requirements for the degree of Master of Arts.

[2] Ward G. Reeder: "The Business Administration of a School System." Ginn and Co., Boston, 1929, p. 319.

INVENTORY SHEET

Sheet No. _____ Room _____

Building _____ Department _____ Examined or Approved by _____

Entered by _____

Name of Article	Vendor	No. of Units Purchased	Date of Purchase	Price	No. on Hand	Value

Continuous Supply Inventory: Form 19

Article.....

YEAR	Dimth. Unit	On Hand Sept. 1	Bought After Sept. 1	Units Used	Value	On Hand June 1	Units Needed	Estimated Cost	
								Per Unit	Total

Dept. of School Administration, University of Nebraska
By W. B. Jackman

SCHOOL ACCOUNTING FORMS
Continuous Supply Inventory: Form 19

employees may better understand the costs of their department and the need for economy.

10. In the event of fire, insurance adjustments may be made more easily and equitably.[3]

When proper methods are used, taking an inventory annually or at least periodically takes little time in proportion to the value received. Especially is this true in small and medium-sized school systems where there is a tendency to be shiftless and indifferent toward businesslike procedures.

Since it is not possible to discuss exhaustively in the space allotted to this article all the major elements in property accounting, the emphasis is largely given to considering the steps desirable in making an inventory of two items, *equipment* and *supplies*.[4]

Accountants in general agree that an inventory should include all items of school property of a movable nature. Those forms of property that are an integral part of the school building or site are excluded, as are the supplies and materials which are consumed or destroyed when used. The importance of instructional as well as other types of supplies cannot, however, be passed by lightly and should be given equal attention and care in the processes of property accounting. This point of view accounts for the emphasis placed on supply accounting in the title of this article as well as in the article itself.

The Process of Taking the Inventory

As pointed out above, many schools have never kept a property record. In such school systems the first step is to make a careful appraisal of all school property. An inventory sheet or register should be provided which contains columns for each of the following items: name of article; date of purchase; cost; vendor; room or department for which equipment is purchased; amount of depreciation; number of units purchased; total number on hand. The first account of school property should be made with the help of a person who knows the value of school property as well as of depreciation.

After this appraisal is made, it becomes the permanent record of the school system. Thereafter, whenever an article is purchased, the data listed in the above items should be recorded. While a small per cent of the schools taking inventory have clerks who do the checking as designated, most schools adopt the practice of assigning the task to the teachers or principals of the respective school buildings. This method not only is inexpensive but gives all concerned a keener sense of responsibility for school property. Care should be taken to incorporate on the inventory sheets a sufficient number of columns for recording the number of units of each item purchased and in stock each year, as well as a column for depreciation.

Depreciation of Equipment

Perhaps a word should be said about depreciation. Depreciation is the process by which the price or value of any property decreases. It is important as it is related to instruction, insurance, maintenance, and capital outlay. The inventory is essential to establish the depreciation of materials of instruction so that obsolete materials can be discarded, impaired equipment can be rehabilitated, and, above all, proper and adequate provision can be made for replacement. It is obvious that the element of depreciation must be accurately appraised in order to establish a correct basis for insurance. Depreciation is likewise a factor in determining a proper division of money spent on maintenance and capital outlay. Money spent to cover the effects of depreciation is maintenance, whereas money spent to improve or enhance the value or efficiency of an article above its original level is capital outlay. Knowledge of the depreciation of property is therefore important if proper allocation of school money is to be made.

Many authorities urge the adoption of a scale or carefully established rate in figuring depreciation. Engelhardt and Von Borgersrode[5] recommend the following:

[3] Henry H. Linn: "Practical School Economies." Bureau of Publications, Teachers College, Columbia University, New York, 1934, p. 33.

[4] A more detailed and exhaustive classification of property can be found on pages 141-142 of "Principles and Practices of Financial Accounting for Schools," by John G. Fowlkes. E. M. Hale and Co., Milwaukee, 1934.

[5] Fred Engelhardt, and Fred Von Borgersrode: "Accounting Procedure for School Systems," Teachers College, Columbia University, 1927, p. 99.

Distribution of.....

Name of Teacher	Distrib. Unit	Units Used	Unit Cost	Value of Units Used	Name of Teacher	Distrib. Unit	Units Used	Unit Cost	Value of Units Used
Totals					Totals				

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DISTRIBUTION RECORD FORM

Item	*Annual Depreciation Rates in Per Cent*
Automobiles	20
Fireproof Building	2–3
Frame Building	4–6
Boilers	5
Crockery	5–10
Educational Equipment	10
Furniture	5

Comparison with Previous Reports

Much of the value of an inventory will be lost if comparisons are not made with previous reports. From the inventory sheets giving the above data a summary sheet can be prepared, covering a period of five, ten, or fifteen years and giving definitely the trends with respect to each article or item of equipment. A complete picture can thus be had showing whether equipment is worn out, stolen, misplaced, defective, or obsolete, and, furthermore, whether consistent policies have been pursued with respect to the use and purchase of school equipment. Thus, it can readily be seen that providing a proper inventory system encourages businesslike attitudes and procedures, promotes good management, and safeguards the property of the school.

But it should be remembered that taking an inventory of school equipment is only part of the whole task of accounting for school property, for school supplies and instructional materials are intimately connected with the quality and cost of a child's education and the welfare of the community. In a well-ordered school system the accounting for supplies is just as important if not more imperative than taking an equipment inventory.

Simplified Supply Accounting

Attention is called to the fact that the following statements and suggestions are made with the medium and small school system in mind. The principles involved, however, apply equally well to all school systems.

If efficient supply accounting is to take place, each school unit should be equipped with a good supply room. This room should be provided with adequate shelving and good light, and be easily accessible from the main office. It should be in charge of one person. In small schools this task may be left to the principal or superintendent, thereby avoiding all confusion that comes from allowing two or more to assume responsibility. Officials should adhere rigidly to the policy of a locked supply room. This is fundamental in the proper control of supplies. Teachers will accept it as part of the system and fully realize that it is for the benefit of all.

In addition to the values pointed out earlier in this article, wisely accounting for supplies has a value in that it creates confidence on the part of board members. The mere adherence to such a system is enough in many instances to create a strong feeling of trust in the superintendent among the board members.

Furthermore, the satisfaction that comes from knowing "the job is done right" is worth much in the effect it has upon the general feeling and tone of the superintendent. A well-devised supply accounting system will help to do that very thing.

One Method of Accounting for Supplies

Supply accounting does not need to be a complex matter. Every school administrator may account for his school supplies without any undue use of time and keep his record in accordance with good supply accounting principles. By good supply accounting is meant a system which keeps an accurate record of the amount of supplies on hand, their exact value, the amount used, and the individual to whom they were checked out. The supply record form and method described below may be used for the proper accounting of school supplies.

This form provides for the following information: the supply item; the unit cost; the name of each teacher; the value of the supplies used; the units of supplies consumed; the units on hand at the end of the year; and a space for a supply budget to determine the amount and cost of supplies for the following year.

Here is what takes place in the supply accounting procedure: A call for supplies is handed in to the office either at a specified time or at any time when supplies are needed. The one in

Name of supply	Bin No.	Units on Hand	Dist. Unit	Teacher	Teacher	Teacher	Teacher	Teacher	Teacher	Teacher	Teacher	Teacher	No. Units used	Value units used	units on hand	units needed	unit cost	Req. Est.
Brass fasteners	2	23	1 Bx	IIII .55	IIII .44	I .11	II .22	I .11	I .11			I .11	15	1.65	8	7	.11	.77
Chalk	3	7 6	1 Bx	I .12	I .12	I .12	I .12	I .12	I .12	I .12	I .12	I .12	9	1.08	4	5	.12	.60
Colored chalk	3	9	1 Bx	I 1.35	I 1.35	I 1.35	I 1.35	I 1.35	I 1.35	I 1.35			7	9.45	2	5	1.35	6.75
Class Record Bks	4	23	1 Bk	II .40	II .30	II .50	II .30	II .30	II .30	II .30	I .25	II .50	17	4.25	6	11	.25	2.75
Crayolas	3	144	set of 9	250	200	180	240	210					108	10.80	36	72	.10	7.20
Glue	2	9 6	1 Bottle	II .30	I .15	II .30	I .15	I .15	II .30	I .15	II .30	I .15	13	1.95	2	11	.15	1.65
M'lt'g Bd.	1	72 36	1 Sheet	IIII IIII .15	IIII IIII .10	IIII III .40	IIII IIII II .15	IIII IIII IIII .100	IIII .25	III .15	IIII IIII .75		92	4.60	16	76	.05	3.80
Paste	2	13 2	1 Gal.	II 1.00	I 1.50	II 2.00	II 2.00	I 1.50	I 1.20	I 1.50	I 1.50	I 1.50	12	18.00	3	9	1.50	13.50
paper Blue Const.	5	15	1 Pkg.		IIII 1.00	I .25	II .40	IIII 1.00	III .75	I .25			15	3.75	0	15	.25	3.75
				II .30	II .60	III .75	I .25	II .50	I .25	II .50	I .25	I .25	15	3.75	6	9	.25	2.25
Brown Const. Paper	5	15 6	1 Pkg.															

MASTER FORM FOR KEEPING TRACK OF SUPPLIES IN A SMALL SCHOOL SYSTEM

charge goes to the supply room. The teacher, Miss A, called for one ream of penmanship paper, a jar of paste, and a box of penpoints. The supply custodian (the principal, or an individual appointed by him) goes to the supply room, takes the supplies from the shelves, turns to the supply form and places a tally mark after each supply item requested and delivered, under the name of the teacher calling for the supplies.

The record is simple, but complete. It requires only a minute and yet it shows the amount on hand, the amount used up, and the name of the individual teacher using it. It is a record that is up-to-date and continuous. Each call for supplies is handled in a similar manner. The act of distribution is completed when the supplies are taken from the storage room and delivered by the custodian to the classroom or the individual coming in person to make the requisition.

At the end of the year the superintendent spends possibly a few hours in summarizing the supply consumption in his school system. The tally marks are counted. After the count is made, the spaces are filled out with such information as units used, the value of the units used and the units on hand, and the suggested number and value of units needed for the following year.

For a large school system which uses many different kinds of supplies, the same plan of accounting may be employed as that described above, except for the fact that a separate card may be used to account for each separate item in the storage room. Each separate card is a substitute for a single line or item on the master accounting sheet which contains a complete record of a supply item from the time it is stored until it is consumed. That is to say, the supply items are listed on separate cards where the accounting record for each supply is recorded, instead of being listed on the one large sheet where each line contains the information for a single supply item.

The mere listing of equipment and supplies without checking up losses, transfers, waste, etc., does not, however, constitute a complete inventory procedure even when accurately and efficiently checked and recorded. But if the facts are used to realize the values pointed out earlier in this discussion, they yield the information that serves as a foundation upon which good management and administration depends.

Economy in Janitor Supplies and Equipment

BY H. H. LINN*

BUSINESS MANAGER, PUBLIC SCHOOLS, MUSKEGON, MICHIGAN

AMONG the measures taken to improve the efficiency of the janitorial staff of the public schools is that of providing suitable and adequate supplies and equipment to assist the employees in performing their tasks. Many an otherwise competent man is handicapped in the performance of his duties because he is forced to work with unsatisfactory equipment or poor supplies which result in a waste of time and in mediocre achievement. Since salaries for labor account for the major share of janitorial expense, it is poor business to save pennies in purchasing poor equipment and supplies and then waste dollars in labor efficiency. This is not to be interpreted to mean that only the more expensive types of supplies and equipment should be used, for cost alone does not indicate worth, but the suggestion is offered that the cheapest materials (in original cost) may prove to be the most costly in the long run.

Janitorial Equipment

Janitorial equipment, to be truly economical, must be (a) suitable for the jobs involved, (b)

* Author of *Practical School Economies*, Bureau of Publications, Teachers College, Columbia University, New York City, 1934, 461 pp.

usable by those who must handle them, (c) reasonably durable, and (d) priced to give a reasonable cost per unit of usable service. The following illustrations may serve to indicate the application of these criteria.

1. The floor brush is a common type of janitorial equipment. The brush must be of a proper size if it is to be the most suitable for the particular job involved. From the standpoint of original cost, the 14-inch brush is lower priced than the 16-inch brush. Now which size is the more economical? The answer lies in the local situation. For instance, if this brush is to be used in a building where there are fixed seats with narrow aisles, the 16-inch brush may be too wide and may be used awkwardly, not only wasting time but also producing poor results. In this instance the larger and higher-priced brush, other things being equal, is not as suitable or economical as the narrower and cheaper brush. In another local situation where there are movable classroom seats, however, the wider brush may cover more area without the fixed impediments and thus may save time in the sweeping process. In corridors and gymnasiums a still wider brush may save even more time in the sweeping process. However, there are limitations also to the width of brush that may be used. It may be so large that it is awkward and cumbersome and therefore not as usable and economical as a brush of smaller size.

In selecting floor brushes, durability must be considered, and this involves type of construction and also type of materials used in making up the brush. A cheap brush may be made up largely of hair and fiber, while the more expensive brushes contain a large percentage of bristle. The purchaser who buys on the basis of price only may select the cheaper hair and fiber brush but he is almost certain to find that the cleaning results obtained on the average type of school floor will not compare with those achieved with the use of the better grade of bristle brush. In selecting brushes, attention should also be given to the type of construction and the method of fastening the tufts of material into the block. In the cheaper brush these tufts may loosen and drop out, thus reducing its period of usefulness.

Attention should also be given to the comparative costs per unit of service. For a brush, this unit may be per square foot or per thousand square feet, or some other measure of area. On such a basis it may be found that the cheaper brushes with a short life will cost more per unit of service than the better brushes with the higher original cost. Here attention may be called to a difference in brushes which has a distinct bearing on the ultimate cost per unit of service, but which is occasionally overlooked. Two brushes may be of the same size, with the same kind and percentage of bristle, hair, or fiber, with the same general type of construction, but with a different length of tuft out of the block, one being 3½ inches out of the block and the other 4 inches. Assuming that the tufts are properly imbedded in both blocks to approximately the same depth, it may be assumed by the unthinking person that the brush with the 4-inch stock is worth approximately one-seventh more than the brush with the 3½-inch stock because of the additional ½-inch length of tuft. However, the difference in worth is greater than this, for the first 2 inches of stock out of the block may be considered as having no sweeping value. On this assumption, the brush with 3½-inch stock has 1½ inches for sweeping, while the 4-inch stock allows 2 inches for sweeping. On this basis, the 4-inch stock is worth a third more than the 3½-inch stock. This difference, of course, is not accurate, but the illustration serves to call attention to the fact that the length of brush stock is an important item to consider when prices are compared.

While quite naturally there is some difference of opinion as to the best specifications for making up a floor brush, it may be stated that a brush with approximately 70 per cent of good Russian or Chinese bristle, 15 per cent horsehair, and 15 per cent fiber, with not less than a 4-inch stock out of the block, will prove quite serviceable for most classroom sweeping. After considerable use, it may be used for corridor sweeping, and later for sweeping on concrete. Still later, when the bristles become short (2 inches or less) it may be used as a scrub brush.

2. Many school systems are finding that the so-called dry mop method of sweeping is superior to the brush method from both the standpoints of time saved and cleaning results. In some cases homemade mop holders are constructed to hold from three to six ordinary cotton mop heads (side by side) which are chemically treated with a light oil. These mops are simply pushed over the floor surface, picking up the dirt and dust even more effectively, in many cases, than with brushes. Best results are obtained on floors that have been properly finished, sealed and treated so as to form a smooth surface. This method of sweeping is a great time-saver, and especially in corridors and gymnasiums that permit the use of a wide mop. School officials who have not experimented with dry-mop sweeping should investigate this method of cleaning.

Cheap, shoddy mop heads unravel and wear out quickly with use. The well-constructed heads stand abuse, wringing and cleaning, and in the long run are more economical than the cheapest heads.

3. Cheap light-weight buckets do not stand hard usage and abuse as the heavier and better constructed buckets do, and are therefore more expensive in the long run although the original cost may be less. The same may be stated for the light-weight dustpans as compared with the heavier and more sturdily constructed pans.

4. There are a number of efficient electric scrubbing and polishing machines on the market which are real time- and labor-saving devices. On the basis of cost per unit of service, the saving in labor with the use of these machines as compared

with the much slower hand scrubbing and polishing makes the machines a wise and economical investment, provided the school system is of sufficient size to warrant such a purchase. All such machines are not of equal worth, however, and a few have proved to be poorly designed or constructed.

Janitorial Supplies

The subject of janitorial supplies deserves far more attention than it has received in the past. The subject should be reasonably simple, but so many questionable statements and doubtful facts have been uttered by individuals engaged in marketing these products that the average person is bewildered and suspicious.

Pale paraffin oil, for example, which may be purchased directly from the oil-distributing companies at a very low price, has often been given a trade name by some firm engaged in selling floor oil and resold at a mark-up of several hundred per cent.

Trisodium phosphate, a white crystalline substance resembling sugar or salt, that has proved to be an excellent water softener and cleaning agent if properly used, is sold by dozens of different firms under their special trade names, but usually at a price considerably higher than would have to be paid if the purchasers bought the material as trisodium phosphate instead of as some especially and marvelously concocted substance.*

Roach powders sell at high prices under special trade names, but sodium fluoride, which is the chief ingredient and is the destructive agent, may be purchased as such at a much lower price and used with almost the same degree of success.

Liquid hand soaps are given different trade names, different scents, different colors, different prices, and different sales arguments, but in the final analysis, the buyer can purchase a heavy 40 per cent liquid soap made of pure cochin coconut oil saponified with potash from a number of large soap-making firms at a very reasonable figure, which will serve the purpose fully as well as the products so handsomely described by the usual run of janitor supply salesmen. These 40 per cent soaps may be diluted and reduced to approximately 15 per cent soap content by the addition of water, preferably distilled.

To secure economy in the use of janitorial supplies, the employees should understand how to use them to the best advantage and should be warned against being too liberal in their applications. Too many of these employees have the mistaken idea that if a little material is good, more of the same substance must be still better. Therefore, they use more of the material than is necessary and actually achieve poorer results. For illustrations:

(a) For general cleaning purposes, 1 to 2 tablespoons of trisodium phosphate per gallon of warm water, will make a solution of sufficient strength to remove the usual grime on schoolroom furniture and woodwork. If the solution is made much stronger it will injure the varnish. (Trisodium used at the rate of 1 pound per gallon of water may be used as a varnish or paint remover.)

(b) Liquid wax should be applied to the floor in a very thin coating. If the wax is applied too liberally, the floor becomes greasy or slippery. Two thin coats of wax buffed separately will be much better than a single heavy application.

(c) If soap is used for cleaning, too heavy a soap solution will have a tendency to leave a greasy, filmy surface, unless it is more thoroughly rinsed, which requires additional time and energy.

(d) A 15 per cent liquid soap may be considered suitable for hand-washing purposes in schools. Pupils use about the same quantity of soap regardless of the density (unless it is much too thin) and it is therefore wasteful to provide them with the much heavier liquid soaps.

(e) If abrasive materials such as Bon Ami are used for cleaning windows, a very heavy coating requires more labor for removing the dust along with the grime than does a lighter application.

(f) If furniture polish is used, a heavy application requires more rubbing to obtain the desired result than would be required if a light application were made. Too much of the material has a tendency to leave a greasy surface.

(g) In treating or oiling wooden floors, there is a tendency on the part of some employees to give a very heavy coating to the surface in the belief that it will be just that much better than a lighter coating. The final result is often a spotty or "tacky" floor, and one that cannot be given a simple daily cleaning without experiencing some inconvenience.

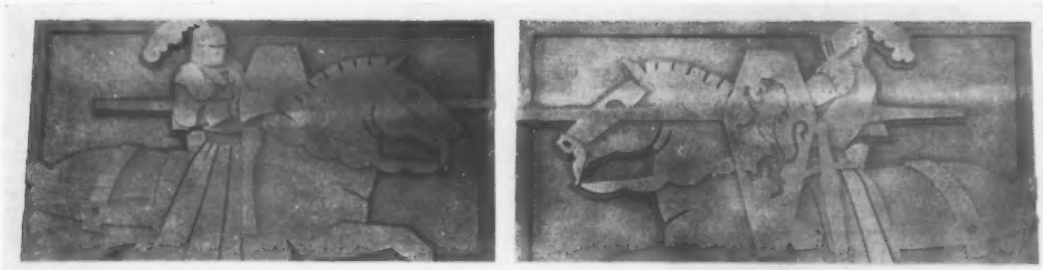
Sources of Information

There are many good sources of information regarding the use of janitorial supplies. The *Handbook of Buying*, September, 1934, put out by Consumers' Research, Washington, N. J., and available to members of this organization, contains many pertinent suggestions relative to the selection, use and manufacture of certain types of such supplies. The following recommended publications may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C.:

1. Circular of the Bureau of Standards No. 70, "Materials for the Household." (50¢)
2. Circular of the Bureau of Standards No. 383, "Washing, Cleaning and Polishing Materials." (10¢)
3. Farmers' Bulletin No. 1180, "Housecleaning Made Easier." (5¢)
4. Farmers' Bulletin No. 1219, "Floors and Floor Covering." (5¢)

Federal specifications for janitorial supplies may also be obtained from the Superintendent of Documents. These are published as circulars of the Bureau of Standards.

* Some firms mix trisodium phosphate with other cheap cleaning substances, and make extravagant claims for superiority.



PANELS AT THE ENTRANCE TO THE GYMNASIUM OF THE NOAH WEBSTER GRADE SCHOOL, HARTFORD, CONN.

The Use of Color in the Remodeling and Renovating of School Buildings

BY T. MERRILL PRENTICE

ADAMS & PRENTICE, ARCHITECTS, NEW YORK

IN remodeling a school, three considerations are vital—plan, choice of materials, and color and decoration. The first two are determined, or at least largely affected, by the budget, and are widely discussed by those who have to do with the building of schools.

The use of color and the choice of materials for decoration, however, are not generally understood as applied to schools. Color is inherent in every material. Everything which goes into a building permits a choice of color, whether the material is to be left in its natural state or covered with a protective coat of paint. In this discussion of color, I want to avoid entirely the question of taste. A color scheme can be reasoned out logically. The scheme once determined permits the exercise of taste in its development.

A public school divides itself into elements which can be discussed in groups. Such groups are: (1) the classrooms; (2) special rooms, such as art, science, kindergarten; (3) large assembly rooms—auditorium and gymnasium. These groups are connected by space used exclusively for circulation—corridors and stairways. The color scheme in any space must be based on the use to which it will be put. Determining factors will be the function of the space, its orientation, its exposure, and the geographical location of the building.

Color for Classrooms

The function of the classroom is to provide a space in which a group of children may study. This implies a certain reflection of light from walls and ceiling in relation to the window area. A light color should be chosen. The orientation may determine whether the color should be cold or warm. A room with a great deal of direct sun should be cold, and a room without much sun should be warm. (It might be mentioned that the warm colors are: reds, browns, yellows; the cold colors are: blues, grays and greens.) Certain colors are stimulating (red) and others are restful (blue and green). We must choose the soft, restful colors to permit concentrating on the work in hand, rather than the stimulating colors, which would tend to induce restlessness. The color should be light in value, and warm or cold depending upon the amount of sun. It must of course harmonize with the furnishings which cannot be varied at will—floors, furniture, blackboards.

It should be borne in mind that paint is not the only means of applying color. Wallpaper can quite properly be used in classrooms, often with excellent effect, and even with a saving in cost. Washable wallpaper is preferable. If paper is used, the question of pattern is added to that of color value, and a complex color scheme rather than a simple one is possible.

Classrooms should not be all alike. If the platoon system is adopted, the children move from room to room many times a day; at least they change rooms each school year, and monotony should be avoided. Since it is not practical to decorate each room differently, a good compromise is to adopt two color schemes and alternate them.

Special Rooms

Special rooms, like classrooms, must be treated according to their function. In science rooms and art rooms absence of color is desirable because the color of the objects studied is important and there must be no reflected color to distort it. Reflected light is less important than direct light; therefore a neutral color somewhat darker in value than for classrooms suggests itself. Kindergartens are for very young children, of whom no great concentration is expected. The walls should be gay and colorful. Happiness is more important than ideal conditions for study. In libraries where the pupils are not under close supervision, an atmosphere of comfort is desirable. The room should be made inviting, informal, even cosy and

KINDERGARTEN OF THE WEST MIDDLE SCHOOL, HARTFORD

homelike. A suggestion of wood paneling in connection with the bookshelves can usually be worked out economically. A fireplace is desirable to establish the keynote of the room. Books make an excellent wall treatment for a library. If there are not enough books to line the walls, wallpaper is excellent and often preferable to paint. A few well-chosen pictures will help. The room should be rich and warm in character. Avoid all suggestion of cold formality. A domestic science room should receive a free treatment reproducing as far as possible a homelike atmosphere suitable to what is taught there. Avoid all suggestion of the laboratory.

The Auditorium

In the assembly rooms the study of color should not be neglected, although the scheme is less easily defined. An auditorium may be treated without much regard for reflection of light from the walls, because interest is usually concentrated upon the

THE LIBRARY, WEST MIDDLE SCHOOL, HARTFORD

platform or stage rather than upon work in the hands of the members of the audience. Never place a window behind a speakers' platform. Choose a color for the background of the stage or platform that will best permit the audience to see the expression on the face of a speaker. Since the face is light, choose a dark background. If possible, make the room handsome without being restless. It is not necessary to spend money for elaborate decoration if a combination of colors is carefully selected. About the auditorium it is hard to generalize. This space leaves more to taste than any other.

AUDITORIUM, WEST MIDDLE SCHOOL, HARTFORD

The Gymnasium

The gymnasium need not be ugly. The writer was once laughed at by a building committee for proposing to make a gymnasium handsome. They visualized a gymnasium as a barn of a place where no effort, and certainly no money, was to be spent to mitigate its inevitable ugliness. The effort at least was lavishly expended, and the room is handsome as well as economical. The result was achieved largely by the use of color. Good visibility for games is essential in a gymnasium. Some form of acoustical treatment is highly desirable, and of course the safety of the children must be considered in the choice of wall material at least head-high. Unlike classrooms, a gymnasium should be stimulating in color. It is a space for action and not contemplation. Red suggests itself. The color scheme of the gymnasium referred to above was natural cork wainscot for protection; gray brick walls; ceiling panels of natural acoustical tile; beams rose-gray and deep rose; sash, pipe rail of balcony and doors rich strong red.

In conclusion I want to suggest that often the color and texture inherent in a material in its natural state are excellent and may be lost by the application of paint. Its omission may give a better result and reduce the cost. In consultation on the selection of colors for a school, I was asked what color to paint the interior of the auditorium, which was finished in common brick. The room was well lighted from both sides. The color and texture of the brick were good. I suggested leaving it as it was, and choosing an acoustical tile for the ceiling which was manufactured in three colors and would harmonize with the brick without further color treatment.

Often materials may be chosen which will be functional as well as decorative in preference to materials which are merely functional, and require some form of applied decoration. In this way savings may often be effected. If paint is used, one color or shade costs the same to apply as another, but the esthetic and even the physiological effect will be vastly different. I plead for more color in school buildings—intelligently used.

NOTE.—The work illustrated was executed in association with Carl J. Malmfeldt, of Hartford, Conn.

The Modern Trend in School Construction

BY REGINALD E. MARSH
TOOKER & MARSH, ARCHITECTS, NEW YORK

THE last few years have seen a remarkable improvement in school-building construction in both design and practicability. This is due in no small degree to the conditions under which we have been living. The lull in the building industry has provided the opportunity for research work on the part of manufacturers and individuals.

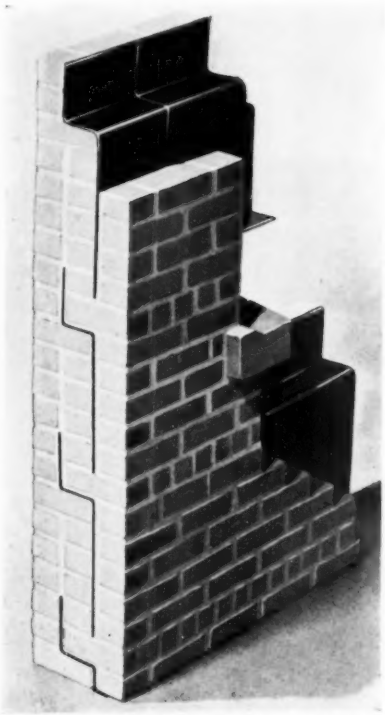
In the present situation, lack of employment has forced many people to step outside their usual lines of activity, and with time at their disposal they have developed ideas which otherwise might never have been born. This is particularly true in the art of building, and is best proved by the publicity given to these various developments by architectural and engineering publications which have recently made them the subject of featured articles.

Educational requirements have greatly increased the problems of planning school buildings. In addition, building codes in some states have been revised, necesitating stricter attention to details of planning as well as construction. Despite these conditions, the cost of building schools has not increased out of proportion to that of other types of buildings, owing to the improvements made in methods of construction and finish. Necessity for economy without sacrificing quality has been the basis of most recent developments.

Wall Construction

There has been little change in the kind of materials for wall construction, the same basic materials being used, namely, clay and cement products. Geographical conditions have determined to a large extent the type to be used. Concrete, tile, and stucco are suitable for certain climates, such as that of the southwestern states; in the earthquake zone, reinforced concrete is accepted as the best construction so far devised.

For general uses, however, no one has developed any product superior to the ordinary brick. Nevertheless, brick masonry has some drawbacks, and efforts are constantly being made to discover ways and means of overcoming these faults—particularly leaky walls. For the past three years, the United States Bureau of Standards has been carrying on a number of tests financed by the Portland Cement Association, National Lime Association, American Face Brick Association, and a group of masonry cement manufacturers. This is the first time that such united action has been taken. Continued complaints necessitated some drastic action. Each type of material and even the various brands of such material were under suspicion. Both the architect and the contractor were at a loss to know what to believe. The tests were made under the most equitable arrangements possible, and each manufacturer who submitted material agreed to accept the report of the results as correct. This report has just been released.*



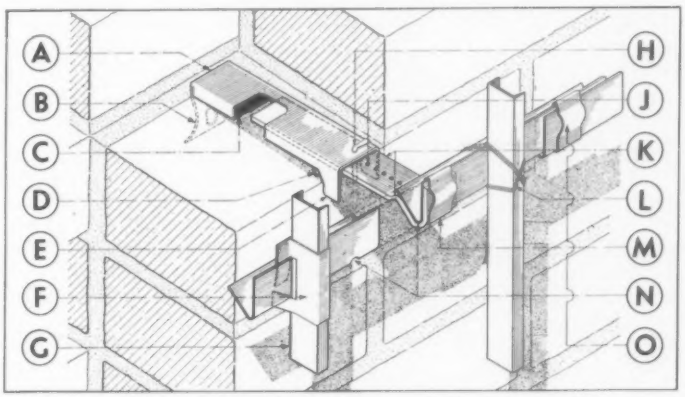
Courtesy of Arved L. Larson, New York City

FIG. 1. THE LARSON PRE-FORMED WALL UNIT

It is conceded in the report that most of the trouble with leaky walls is due to two causes; namely, insufficient bond between the brick and mortar, and careless workmanship. The latter fault, being mechanical, should be overcome by greater efficiency on the part of the mason. It is believed that, by means of a proper mortar mix and a brick of certain absorption qualities, the other difficulty can be overcome. The mortar should be smooth or "buttery" so as to spread easily, and at the same time it should have water-retaining capacity within itself, which result can be obtained by using certain compounds. The rate of suction is of vital importance, as it affects the volume change or shrinkage of the mortar. Too much absorption is just as bad as too little. The rate of absorption must also be taken into consideration. Just what the proper amount and rate of absorption should be is dis-

* United States Research Paper RP 683; American Society for Testing Materials, Reprint No. 57.

cussed in the report mentioned above. A brick which takes 24 hours for complete absorption is obviously superior to a brick which soaks up the water like a sponge. This is so because it prevents the wall from becoming saturated during long driving rainstorms. It is expected that as a result of these tests greater care will be taken by the brick manufacturers in the manufacture of their brick products, because the spread of suction as well as porosity is dependent to a large extent on the method of burning.

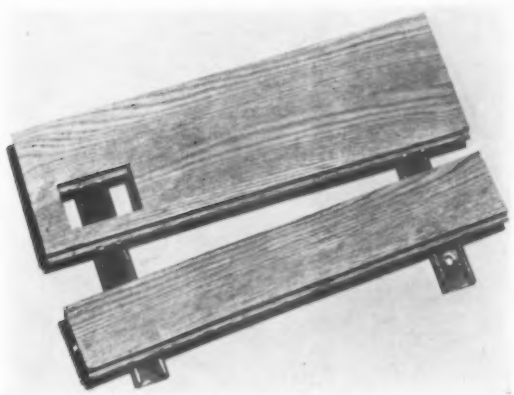


Courtesy of Simplon Products Corporation, New York City

FIG. 2. THE SIMP-L-ON SYSTEM OF WALL FURRING

Improvements in metal flashing have been made, both in the material itself and in the method of installation. Crimped and interlocking flashings carried through the entire thickness of the wall give the most efficient result. Spandrel flashing, which means a continuous membrane installed over window heads or around the entire perimeter of the building at the floor levels, is a comparatively recent development. Originally of metal, later of asphalt-saturated fabric, there is now a combination consisting of a waterproofed membrane veneered with a thin layer of metal which can be shaped in place as easily as the fabric itself. The object of spandrel damp-proofing is to form a positive stop to any moisture which might seep through the brickwork. The greatest trouble with such moisture occurs at window heads. However, such moisture affects other parts of the structure which are not so obvious but nevertheless just as important, such as the furring, lath and plaster. As a result, one of the latest developments along this line is the use of pre-formed sheets so installed in the masonry wall as to form an over-all stop to any possible seepage of moisture through the wall, and at the same time to create a mechanical bond in the masonry itself. (See Fig. 1.)

Even though such precautions are taken, the matter of condensation is still to be considered. There is a certain amount of moisture in the air at all times. The difference of temperature between the exterior and the interior of a building causes moisture to condense, and affects the plaster and finished wall surfaces. It is only recently that the matter of exterior wall furring has been given the consideration it deserves. The object of such furring is to provide an air space between the masonry wall and the finished plaster. It is a conceded fact—which has been overlooked for some strange reason—that a 1-inch furring does not provide the necessary over-all free air space. Regardless of whether tile, wood or metal is used, this space is practically filled with mortar. In order to obtain a good job of plaster on lath, it is necessary to force the scratch coat through the metal lath at least ¾ of an inch on the average for the "clinch." It can be readily seen that there is practically no air space left, because a good deal of the scratch coat is pushed directly against the masonry. Consequently a 2-inch space between the lath and the masonry wall is the least possible to provide for the desired 1-inch clearance. A simple and practical method of accomplishing this result in an economical manner has been recently developed, using rust-resisting and fireproof materials. Wtih this method it is impossible for any moisture on the exterior walls to reach the plaster. It is also adjustable after erection so as to provide an absolutely true surface for the lath. (See Fig. 2.)



Courtesy of the Loxit Company, Chicago, Ill.

FIG. 3. THE LOXIT METHOD OF WOOD FLOOR LAYING

Roofs and Floor Construction

During the past few years, many different systems of floor and roof construction have been put on the market. The so-called metal lumber or bar joist is not a very recent product, but there have been many improvements in connection with it. For those who are not familiar with metal lumber—it is a light pressed steel beam (either solid or perforated) or welded joist consisting of angles or tees and a continuous bar in truss form. These joists replace the wood joists, and conse-

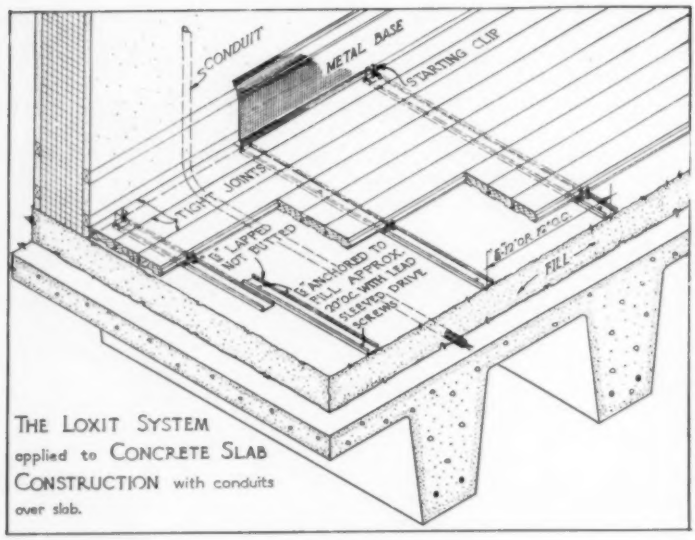


FIG. 4

quently the building is made more fireproof. Over the joists is placed a ribbed metal lath and at least 2 inches of stone or gravel concrete. In place of the concrete, a precast slab has been developed made of light material such as gypsum, which is tongued and grooved like wood flooring. This is particularly useful for roof construction and has materially helped in obtaining a fire-resisting roof construction at very little additional cost. Metal lath and plaster form the ceilings underneath. Many experiments have been tried, more or less successfully, to eliminate plaster on the ceilings by using reinforced concrete slab construction poured on forms of various materials with specially prepared surfaces, which, when removed, leave the concrete construction with a smooth finish which can be painted. One difficulty here concerns the matter of acoustics, treated briefly hereinafter. However, this objection may be overcome in the near future as a result of the experiments being made in the manufacture of light-weight floor construction. The porosity required in such materials may readily result in an excellent sound-absorbing surface.

Floor Finish

One of the greatest problems met with, as far as interior finish is concerned, is the matter of floor covering. A perfect floor material can be described as economical, quiet, resilient, non-slip, fireproof, durable, tight, non-cracking, easily kept clean and good-looking. Up to the present time, to the writer's knowledge, no such perfect flooring has been discovered, although efforts are being made constantly with a number of materials which meet most of these qualifications. In any school building one will find a number of different flooring materials, whereas a perfect flooring material could be used throughout.

School floors are subjected to a great deal of wear, particularly corridors; consequently, the harder surfaces seem to be preferred. Such materials require cement, which is apt to crack. Expansion joints help considerably, but do not seem to overcome all the trouble. Such floors are also noisier because of the hard surface. A cement floor can be painted or made with integral coloring compound. While it is the cheapest of all floors, it must be laid by mechanics skilled in this line of work, otherwise it will not be smooth and level and will be apt to become loosened. Terrazzo makes a beautiful floor finish, hard and durable; it can be made non-slip with carborundum or alundum grits, and when laid with expansion joints it is very serviceable. However, care must be used in locating the joints over beams and other similar supports, otherwise the terrazzo will crack at these points.

Composition floors still have their adherents. Asphalt mastic and rubber tile, particularly the former because of cost, are being used extensively. Mastic tile is resilient, durable and quiet. It is fire-resisting, and when laid in asphalt mastic it is not subject to moisture conditions and does not become loose. However, special attention must be given to the base under the tile to prevent spalling of corners and cracking. The greatest objection to its use lies in the difficulty of keeping it clean owing to the material of which it is made. Consequently, many kinds of floor finishes have been developed which have helped materially. The use of marbleized tile, either mastic or rubber, is recommended because such tile does not show footmarks so noticeably. Linoleum, either in large pieces or tile shape, gives as satisfactory service as any type of flooring now on the market. Hardwood, particularly maple, is used to a large extent for classrooms, gymnasiums and vocational shops. Another of the recent inventions is a method of securing the strips of flooring by means of channels secured to the under floor and metal clips which are inserted in these channels and driven over the tongue of the finished flooring. It is claimed that any movement in the floor will extend over the entire area and shrinkage cracks will not appear. If so, one of the chief objections to wood flooring will have been overcome. (See Figs. 3 and 4). Considerable research is still being made to obtain a satisfactory floor finish for wood. One of the best is a so-called penetrating varnish.

Wainscoting—Acoustics—Color

Another problem in the past has been the selection of a material for the corridor wainscot. Appearance, durability and upkeep are the important factors to be considered. It is generally

conceded that a glazed impervious material is the most satisfactory. Tile, glazed brick, and machine-made terra cotta come under this classification, and there are many new materials now available for this purpose which give satisfactory results. Smaller units are preferable, with an over-all light shade, a dark base and possibly a dark cap or narrow strip of contrasting color near the top. Five feet six inches seems to be a practical height. Drinking fountains should be recessed, and such recesses can be given special treatment which will add to the attractiveness of the corridor.

More and more attention is being given to the matter of acoustical treatment, particularly for corridors, auditoriums, gymnasiums, music and commercial rooms. A little acoustical treatment, judiciously placed, will produce remarkable and worth-while results. There are many types of acoustical treatment on the market, such as acoustic plaster and tile. Each product will produce results, but these results vary greatly. Tests seem to prove acoustic tile to be more efficient than plaster, but even the various types of tile differ in their coefficients of absorption. Each kind of material is suitable for specific purposes. Consequently, it is advisable to consult an acoustical engineer for all major rooms. Where hard plaster finish is used in classrooms, a ceiling treatment of acoustic plaster will be sufficient. The use of painted concrete for ceilings will intensify any acoustic trouble, and under these conditions it may be necessary to use some acoustic treatment on the wall. However, no two rooms seem to give the same results.

Pre-tinted plaster and other colored material for finished plaster surfaces are now available for all purposes. It is possible to obtain large tile units backed with paper, which can be erected like ceramic tile. With such developments it should be possible to use more color in the rooms at no additional cost.

No school is complete without radio. Even though the equipment itself cannot be installed immediately, a complete system of conduit should be provided for its future installation. It is expected that ultimately a complete educational program will be broadcast by the Government. In addition, the benefit of a public address system whereby the principal can speak to the entire school or any portion of it at a moment's notice is apparent. The development of a simple and low-cost talking picture equipment has permitted its use in the more recently built schools.

Circulation of air is now considered as important as the actual intake of fresh air. The trend towards air conditioning should have a vital influence on the heating and ventilation of schools when the cost of such equipment becomes reasonable.

Without doubt there are many other improvements in all branches of the construction industry which have not yet been introduced. There seems to be no limit to the possibilities. It does not necessarily mean that all new products are good or practical. It behooves the architect to investigate and choose carefully. As a whole, the quality of school-building construction is on the up-grade, and the depression has promoted rather than retarded this progress.

Self-Inspection of Buildings for Fire Protection

BY T. ALFRED FLEMING

Supervisor, Conservation Department, National Board of Fire Underwriters

AN average of over seven million dollars worth of school buildings burn every year, and in 85 out of 100 cases the direct cause of the fire may be traced to improper maintenance, and what might have been a small blaze becomes a large fire because of faults in the original construction of the building.

One reason for the continuance of these needless catastrophes is the widespread idea that a school is safe because it is new and built of fireproof material, when, as a matter of fact, there is no fireproof building known in the world today.

However, if danger-points where fire may originate are eliminated, and arrangements are made in construction so that fire can be controlled for the first five minutes without the escape of gases, fumes and smoke from the point of origin, fire departments may be depended upon to prevent catastrophes. It is unfortunate, therefore, that very few people, even among those most intimately concerned with school building and maintenance, know just what faults in construction constitute fire hazards, and what is necessary in proper maintenance of buildings to avoid the possibility of a tragedy.

Reproduced herewith is a self-inspection blank for schools, which should be of far-reaching importance in drawing attention to hazards and in encouraging constant vigilance in coping with them. Prepared for and adopted by the National Association of Public School Business Officials by the National Board of Fire Underwriters, it incorporates the ideas of more than fifty of the best authorities on fire safety in the United States and Canada. Its proper use necessitates an interest in and a complete understanding of school fire hazards by those responsible for the keeping of the buildings, and, conscientiously used, it should have an immediate effect in preserving life and property. (See pages 138 and 139.)

SELF-INSPECTION BLANK FOR SCHOOLS

Prepared by

The National Board of Fire Underwriters

Chicago New York San Francisco

Approved and Adopted by

The National Association of Public School Business Officials

If precautions are taken to minimize the danger of fire and to provide for safety in case fire occurs, real progress will be made in safeguarding life and protecting property. Intelligent thought and care in practice can eliminate practically all fires within schools.

INSTRUCTIONS

Inspection to be made each month by the custodian and a member of the faculty at which inspection only Items 1 to 20 need be reported. At the quarterly inspection, a member of the fire department should accompany the above inspectors, and the complete blank should be filled out. The report of each inspection (monthly and quarterly) is to be filed with the Board of Education or School Commissioners.

Questions are so worded that a negative answer will indicate an unsatisfactory condition.

Name of School..... Date .....

City .....

Class: Elementary.....Junior High.....Senior High .....

Capacity of School?..... Number now enrolled.....

1. Are all exit doors equipped with panic locks?..... Are these locks tested each week to insure ease of operation?..... Do these lock securely so that additional locks, bolts or chains are not necessary?..... Are such additional locks open whenever building is in use?.....
2. Are all outside fire escapes free from obstructions and in good working order?..... Are they used for fire drills?.....
3. Is all heating equipment, including flues, pipes and steam lines:—
   (a) in good serviceable condition and well maintained? .....
   (b) properly insulated and separated from all combustible material by a safe distance?.....
4. Is coal pile inspected periodically for evidences of heating? .....
5. Are ashes placed in *metal* containers used for that purpose *only*?.....
6. Is remote control provided whereby oil supply line may be shut off in emergency?.....
7. Where is outside shut-off valve on gas supply line?.....
   .....
8. Check any of the following locations where there are accumulations of waste paper, rubbish, old furniture, stage scenery, etc., and explain under remarks;— attic, basement, furnace room, stage, dressing rooms in connection with stage, other locations .....
9. Is the space beneath stairs free from accumulations or storage of any materials?.....
10. What material or preparation is used for cleaning or polishing floors?.....
    Quantity on hand?.....Where stored? .....
11. Are approved metal cans, with self-closing covers or lids, used for the storage of *all* oily waste, polishing cloths, etc? .....
12. Are approved metal containers with vapor-tight covers used for all kerosene, gasoline, etc., on the premises? ..... Why are such hazardous materials kept on the premises?
    .....
13. Are premises free from electrical wiring or equipment which is defective?.....
    (If answer is *No,* explain under **Remarks.**)
14. Are only approved extension or portable cords used? .....
15. Are all fuses on lighting or small appliance circuits of 15 amperes or less capacity?.....

(Continued on reverse side)

16 Are electric pressing irons equipped with automatic heat control or signal and provided with metal stand? .....

17 Are sufficient fire extinguishers provided on each floor so that not over 100 feet travel is required to reach the nearest unit? .....

In manual training shops and on stage, 50 feet? .....

18. Have chemical extinguishers been recharged within a year? .....

Is date of recharge shown on tag attached to extinguisher? .....

19. Is building equipped with standpipe and hose having nozzle attached? .....

Is hose in good serviceable condition? .....

20. Is a large woolen blanket readily available in the domestic science laboratory for use in case clothing is ignited? .....

Remarks (Note any changes since last inspection)

The following items to be included in each quarterly inspection:—

21. Building construction: Walls..... Floors ..... Roof .....

No. stories .....No. class rooms.....

22. Which sections of buildings are equipped with automatic sprinklers? .....

.....

23. Are there at least two means of egress from each floor of the building? .....

Are these so located that the distance measured along the line of travel does not exceed

From the door of any classroom, 125 feet? .....

From any point in auditorium, assembly hall or gymnasium, 100 feet? .....

24. Are all windows free from heavy screens or bars? .....

25. Do all exit doors open outward? .....

26. Are all interior stairways enclosed? .....

Are doors to these enclosures of self-closing type? .....

27. Are windows within 10 feet of fire escapes glazed with wire glass? .....

28 Are manual training, domestic science, other laboratories and the cafeteria so located that a fire in one will not cut off any exit from the building? .....

29. Is a smoke-tight projection booth, built of incombustible materials, and vented to the outside, provided for the motion picture machine? .....

30. Are heating plant and fuel supply rooms cut off from the main corridors by fire-resistant walls, ceiling and doors? .....

31. Do all ventilating ducts terminate outside of building? .....

32. State type of construction of any temporary buildings in school yard.....

.....

33. Is nearest temporary building at least 50 feet from main building? .....

34. How often are fire drills held?..... Average time of exit?.....

35. Are provisions made for sounding alarm of fire from any floor of building?.....

Is sounding device accessible?..... Plainly marked? .....

36. Give location of nearest city fire alarm box.....

.....

How far distant from the premises?.....

Remarks

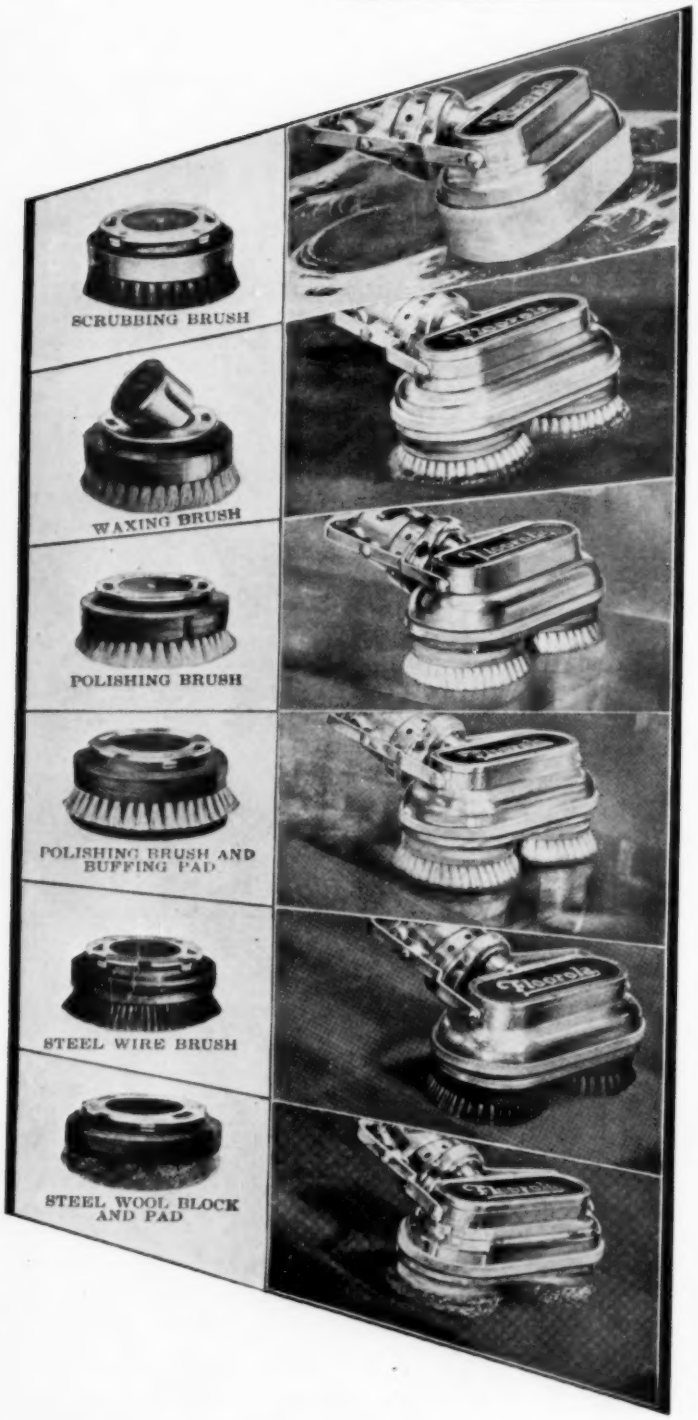
Inspector .....Title .....

Inspector .....Title .....

Inspector .....Title .....

THE FLOOROLA CORPORATION

York, Pa.



WHAT Floorola DOES

SCRUBS

Floorola is ideal for all scrubbing jobs. It will clean tile, marble, cement and rubber floors as they have never been cleaned before.

WAXES

Floorola applies the Floorola-Wax automatically from containers within the distributing brushes, thence to the floor. With Floorola, wax is properly applied—in thin, even coats.

POLISHES

After the application of Floorola-Wax has dried on the floor, it is briskly polished with the polishing brushes. In a comparatively short time the desired lustre appears—you have beautiful floors—floors that will remain beautiful with a minimum of care.

BUFFS

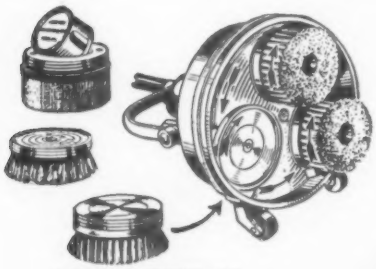
Should you desire a higher lustre, place the buffing pads beneath the polishing brushes. A few minutes' buffing will quickly and easily produce a beautiful mellow lustre.

RENEWS

If floor is dirty, give it a wax scrub. This is accomplished by applying a heavy coat of Floorola-Wax and scrubbing with fine steel wool while the wax is still wet. An additional coat of Floorola-Wax will give you the superlative Floorola finish.

The FLOOROLA for School Floors

The Floorola method of floor maintenance is especially recommended for school use. It is built for durability and for ease of operation. Floorola's exclusive automatic principle of wax application is an outstanding important feature; just the right amount of wax being applied in a thin, even coat. This efficient method of wax application gives greater coverage at less cost.



BOTTOM VIEW OF MODEL "A"

Showing clockwise and counter-clockwise motion of brushes. This action effects a perfect balanced machine, ease of operation, no creeping to one side or the other, and produces even, uniform wax distribution

Some FLOOROLA Users

Yale University, New Haven, Conn.
Vassar College, Poughkeepsie, N. Y.
Harvard University, Cambridge, Mass.
Mundelein College, Chicago, Ill.
Sleighton Farm School, Darlington, Pa.
Dept. of Public Instruction, Schenectady, N. Y.
Free Public Library, Washington, D. C.
Arizona Desert School, Tucson, Ariz.
Johnson City Public Schools, Johnson City, N. Y.
Wake Forest College, Wake Forest, N. C.
Massachusetts Institute of Technology, Boston, Mass.
Rockefeller Institute, New York City
U. S. Naval Hospital, Philadelphia, Pa.
U. S. Veterans Hospital, Sunmont, N. Y.
Government Printing Office, Washington, D. C.
U. S. National Museum, Washington, D. C.

And Thousands of Others Throughout the Country

MODEL "A" FLOOROLA

Type—3 rotating brushes on revolving disc.
Brush—800 r.p.m.
Weight—27 pounds.
Motor — Universal, a.c. or d.c., 110-volt, ⅓-hp., 60-cycle, single-phase.
Diameter—11".
Standard equipment includes 3 waxing brushes, 3 polishing brushes, 3 scrubbing brushes with apron and 6 cans of Floorola-Wax

DEPARTMENT OF PUBLIC INSTRUCTION
BUREAU OF BUSINESS AFFAIRS
106 UNION STREET
SCHENECTADY, NEW YORK

January 13, 1932

The Floorola Corp.,
York,
Pa.

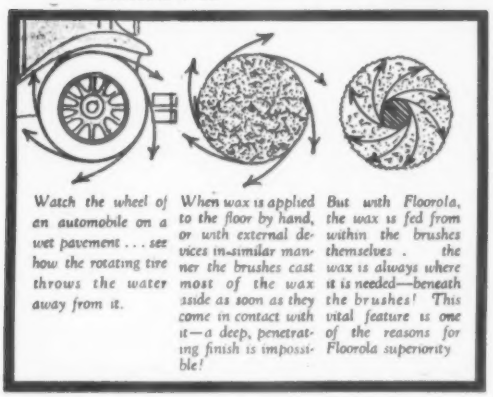
Gentlemen:

I wish to express to you our appreciation of the satisfactory work which your floor polishing machines have done in our school system. As you know we recently ordered two more large machines. I consider the machines actually pay for themselves in the saving of janitorial labor.

I am enclosing an order for two more large type A machines, which makes a total of eight machines now in use in our schools.

Very truly yours,

TMT:D

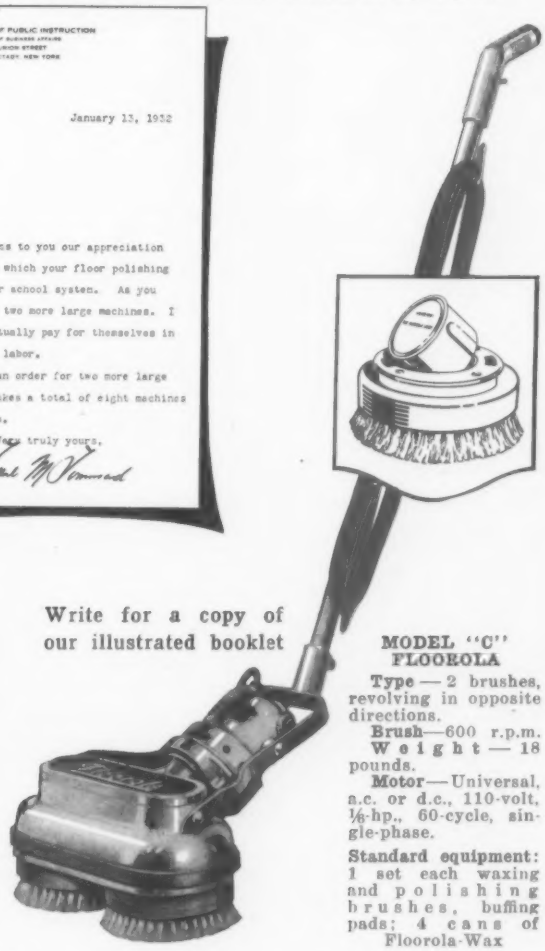


Watch the wheel of an automobile on a wet pavement . . . see how the rotating tire throws the water away from it.

When wax is applied to the floor by hand, or with external devices in similar manner the brushes cast most of the wax aside as soon as they come in contact with it—a deep, penetrating finish is impossible!

But with Floorola, the wax is fed from within the brushes themselves . . the wax is always where it is needed—beneath the brushes! This vital feature is one of the reasons for Floorola superiority

Write for a copy of our illustrated booklet



MODEL "C" FLOOROLA

Type — 2 brushes, revolving in opposite directions.
Brush—600 r.p.m.
Weight — 18 pounds.
Motor — Universal, a.c. or d.c., 110-volt, ⅓-hp., 60-cycle, single-phase.
Standard equipment: 1 set each waxing and polishing brushes, buffing pads; 4 cans of Floorola-Wax

THE AMERICAN SCHOOL AND UNIVERSITY

THE HILLYARD CHEMICAL CO.

St. Joseph, Missouri

A National Maintenance Organization. . . Twenty-eight Years Continuous Service

CLEANERS

SUPER-SHINE-ALL is not a Trade-Mark Reg. soap, but a Neutral Liquid Chemical Cleaner for all types of floors, also painted and varnished surfaces. It cleans, polishes and preserves in one operation. It possesses 100% active cleaning units.

BRITEN-ZIT is the pioneer and nationally Trade-Mark Reg. recognized leader of all heavy bodied liquid cleaners, costs less and is more economical to use.

RENOVATOR. Hopelessly black and gummy oil soaked floors can be brought out to look like new with Hillyard's Renovator.

BLACKBOARD CLEANER chemically removes chalk, dust and foreign substances without injury to the surface.

WOOD FLOOR TREATMENT

HILLYARD'S WOOD PRIMER definitely seals and preserves, insures an ideal surface for the application of any desired finish or treatment.

HIL-GLO FINISH is especially designed to Trade-Mark Reg. serve on Class Room and Gymnasium floors. Universally used for the reclamation and preservation of wood floors.

DIAMOND FINISH produces a brilliant, long Trade-Mark Reg. wearing surface. Easy to apply with brush or mop.

SUPER-SPECIAL GYM FINISH produces a non-slippery, durable and sanitary floor, easy to maintain. Withstands hard and constant wear, insures a perfect non-slippery surface which will not rubber burn.

AUTOMATIC SWEEPING BRUSH leaves a clean lustrous surface, absorbs the dust, saves labor. The wicks are detachable and washable. Sizes 12, 18, 36 inches.

FLOOR MAINTENANCE

HIL-BRITE Self-Polishing Water Emulsion Trade-Mark Reg. Wax, dries bright without rubbing or polishing. Saves time, cuts your waxing cost in half.

TRACKLESS Floor Dressing is a penetrating Trade-Mark Reg. wood preservative, will not track, absorbs dust, keeps the floor neat and attractive.

HIL-MIST sprayed lightly on the floor cov- T.-M. Reg. ers approximately 3,000 sq. ft. per gal. Is economical to use, has wonderful spreading qualities.

HIL-KOTE is a wax treatment for linoleum, T.-M. Reg. cork and wood floors. Will cover more space than wax and wears longer, is easy to maintain.

TREATMENTS

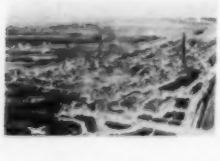
ONEX-SEAL gives positive protection and re- T.-M. Reg. stores the original attractive finish to Terrazzo, Tile and cement. Produces a waterproof, sealed surface. Approved and recommended by Natl. Terrazzo and Mosaic Ass'n.

TERRAZZINE seals the moisture into the Trade-Mark Reg. floor, brings out the true rich colors of the marble chips and cement and adds a permanent sheen. Approved and recommended by Natl. Terrazzo and Mosaic Ass'n.

WINDO-CLEAN dissolves grime and removes dirt, eliminates buckets, sponges, water. Makes glass sparkle.

HIL-VAR, Hillyard's Surface Re-newer brings out the hidden beauty of all woodwork. Applied with brush or cloth. Dries in 45 min.

HI-KO—a Sodium Hypochlorite solution, a T.-M. Reg. preventative of Athlete's Foot. Its regular use insures against the spread of communicable diseases.



Hillyard Products Used Exclusively Two Years, "Century of Progress"

Send for Our CATALOG, 48 Pages of Valuable Information on Floor Maintenance and Sanitation

MILLIONS OF DOLLARS SAVED

RECLAIMING AND REJUVENATING
OLD FLOORS WITH HILLYARD'S

NEW

FLOOR SANDING
AND
STEEL WOOLING
RESURFACING MACHINES

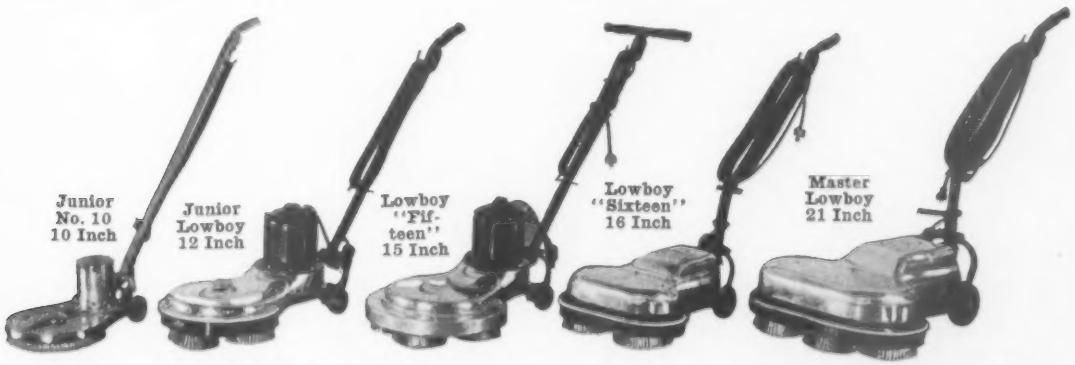
The Greatest Combination Machines Made!

HILLYARD'S HIGH SPEED SANDING REMOVES VARNISH WITHOUT GUMMING. HILLYARD'S PATENTED PROCESS STEEL WOOL ACTUALLY PLANES THE FLOOR TO A HIGH FURNITURE FINISH.

. . . . HILTONIAN Electric . . . .
SCRUBBING *and* WAXING Machines

Hiltonian Electric Scrubbing and Waxing machines are sturdily built and quietly operated. It takes but little effort to operate any of these five machines, due to their perfect balance.

These machines co-ordinate speed, power and weight to give the utmost in all around service. The many years they have been in service definitely proves their sturdiness and efficiency.



THE LAST WORD IN MODERN FLOOR MAINTENANCE MACHINES

NRA

THE AMERICAN SCHOOL AND UNIVERSITY

J. I. HOLCOMB MFG. COMPANY

Draper and Van Buren Streets

Indianapolis, Ind.

EASTERN OFFICE: 437 11th Ave., New York, N. Y.

Products

Cleaning Brushes and Cleaning Chemicals—Floor Brushes, Dusters, Scrubs, Toilet Brushes, Cleansers, Deodorants, Disinfectants, **Floor Finishes,** Polishes, and Toilet Soaps.

The J. I. Holcomb Manufacturing Company is the largest manufacturer and distributor of cleaning brushes and cleaning chemicals. For thirty-eight years thousands of customers have been coming to "Cleaning Headquarters" with both their usual and unusual cleaning problems.

Almost 70 per cent of the schools of the country are using Holcomb Cleaning Tools.

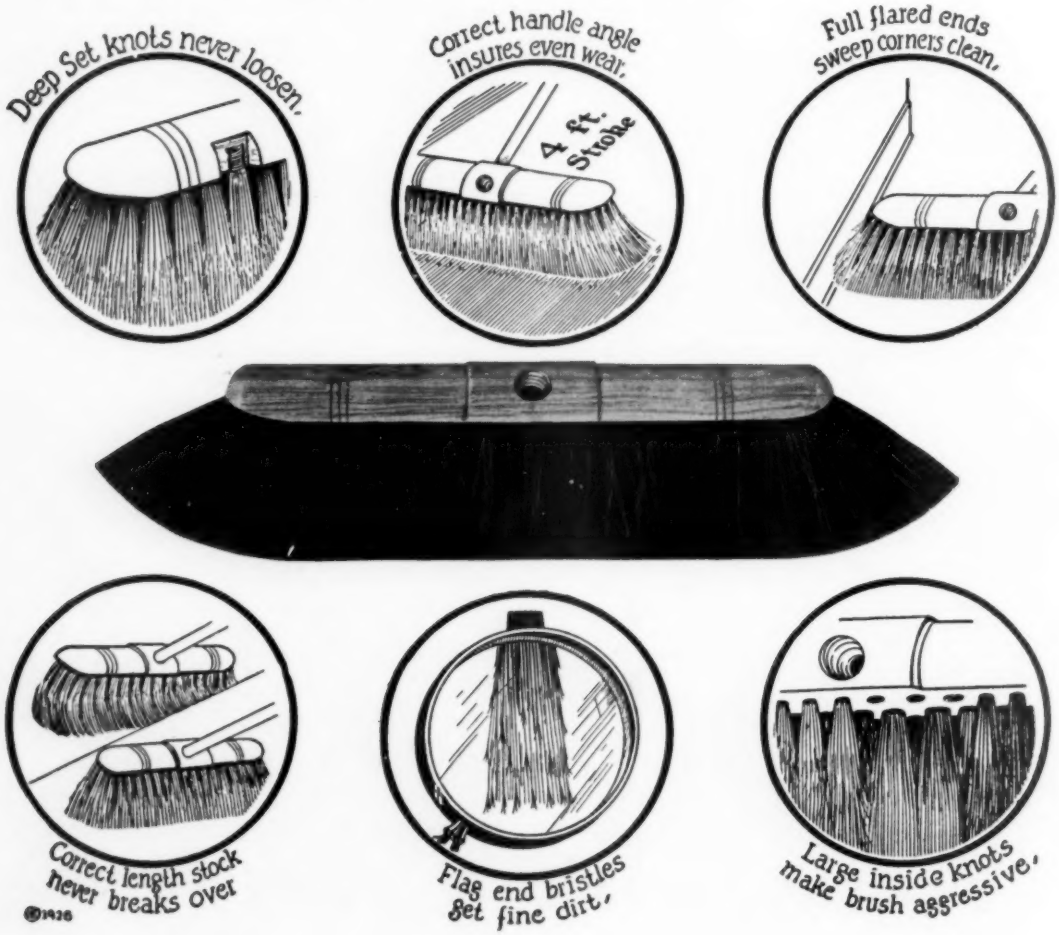
Your Cleaning Costs

"Speeding-up-the-job" is the first thing built into the Holcomb line.

As the labor cost is approximately twenty times the material cost, a 10% saving on the labor makes a profit equal to twice the cost of the material.

Holcomb Floor Brushes

During four to five months of winter, sweeping-time, after the classrooms are vacated, is limited. Holcomb Floor Brushes do the maximum sweeping per stroke with the minimum of labor. "Correct construction cuts cleaning costs"—by speeding up the job.


Deep Set knots never loosen.
Correct handle angle insures even wear.
4 ft. Stroke
Full flared ends sweep corners clean.
Correct length stock never breaks over
Flag end bristles get fine dirt.
Large inside knots make brush aggressive.
©1426

CUT DOWN THE MAJOR COST IN YOUR CLEANING DOLLAR (THE 95% LABOR ITEM)

By Buying Cleaning Brushes and Cleaning Chemicals Built to Do the Given Job in the Least Number of Hours

All the scrap-iron I can carry can be bought for less than 90¢—⅔ of a cent per pound. Still, there's a Burroughs Billing and Listing Machine in the office which weighs only 220 pounds—just 88¢ worth of scrap-iron—but we paid exactly $1,085.00 for it. Where's the difference?

We're pretty proud to have in Indianapolis the manufacturers of about the best automobile produced in these States—the Duesenberg. A standard Duesenberg sedan weighs right at 6000 pounds. Melt 'er up and she'd go under the hammer at $8.00 the ton—$24.00 worth of scrap-iron. But Duesenberg fashions that $24.00 into a product that costs you or me the buxom sum of $13,500.00. Where's the difference?

The "Ford V 8" costs $668.00 and weighs about 2400 pounds. Melt 'er up and the whole "shootin' match" could be bought for $9.60. Where IS the difference?

— *it's the* LABOR *cost!*

FORGET MATERIAL COSTS—THEY'RE INSIGNIFICANT! If you want to do something to REALLY help to "balance your budget" concentrate on saving LABOR TIME! The fellow who does that is the fellow whose balance sheets at the end of the year are farthest from the "red".

In our field (Cleaning and maintenance materials) it is freely acknowledged that "LABOR" costs at least 19 times more than the materials it uses. If you buy $50.00 worth of cleaning materials you gotta dig down deep into SOME sock and distribute $1,000 before you've used them up. The other $950.00 is necessarily spent for LABOR!

There's that type of buyer who takes his "bow" if he succeeds in buying those materials for $40.00—saving a "great big 20%".

THE REALLY *SHREWD* AND *SMART* PURCHASER LAUGHS AT THAT KIND OF ECONOMY. HE BUYS "TOOLS" BUILT TO SPEED UP THE JOB AND *MAKES* AT LEAST 10% OF THE *LABOR COST*—OR $95.00—WHICH IS ALMOST TWICE THE AMOUNT OF THE TOTAL ORIGINAL "MATERIAL" BILL

LINCOLN-SCHLUETER FLOOR-MACHINERY COMPANY, INC.

Established 1898

Phone: Superior { 8944 / 8945

MANUFACTURERS

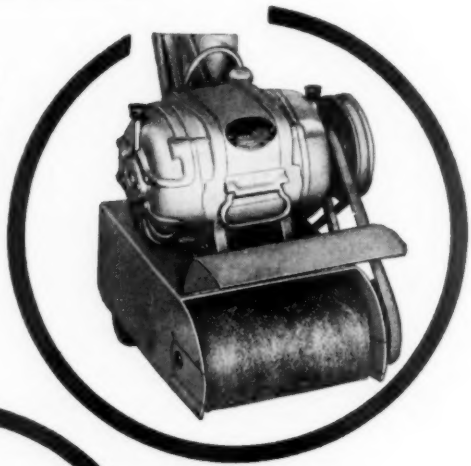
Floor Surfacing - Waxing - Polishing - Scrubbing Machines

213–221 W. Grand Avenue, Chicago, Ill.

THE NEW 3-IN-ONE MULTI-PURPOSE MACHINE

In small classrooms, or large gymnasiums, assembly halls, school cafeterias—regardless of the size of the floor space—the new 3-in-One Lincoln Schlueter Multi-Purpose is the perfect machine for sanding, cleaning, steel-wooling or polishing.

As its name implies, the Multi-Purpose Machine is adaptable to a variety of uses—all necessary to the proper preparation and care of wood floors.



STEEL-WOOLS

SANDING

For sanding newly laid floors, or floors in need of refinishing, the Multi-Purpose is efficient and speedy. It has every desirable construction feature, including vacuum dust collector, high-speed drum, ball-bearings throughout, "V" belt drive, adjustable handle and quick-acting positive sand paper clamps. A most important advantage of this machine is its ability to work directly up to the quarter round.

POLISHES

STEEL-WOOLING

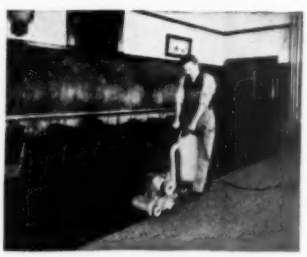
For regular cleaning of wood floors that have been oiled or sealed the Multi-Purpose with steel wool accomplishes an almost unbelievable amount of work—so thoroughly and economically that the saving in time, labor and materials quickly pays for the machine.

SANDS

POLISHING

For polishing wood, linoleum, rubber-tile or any other type of flooring the Multi-Purpose does a perfect job, once over — which many other polishes would require continuous buffing to duplicate. The weight and high-speed of the revolving fibre brush is responsible for this remarkable polishing efficiency. The Multi-Purpose also collects dust as it polishes.

The small illustration below shows a Multi-Purpose steel-wooling off the black dirty accumulation found on a classroom floor that has been excessively oiled



LINCOLN-SCHLUETER TWIN-DISC FLOOR MAINTENANCE MACHINES

Whether the floor space to be scrubbed or polished is measured in square feet or acres, there is a Lincoln Twin Disc Machine of the most advanced design and correct size for economical maintenance.

Since these machines are already standard equipment in many of the largest schools and institutions throughout the country, they need but little introduction.

Thirty-nine years of successful floor machine manufacturing is built into every Lincoln-Twin-Disc. Every product in the Lincoln-Schlueter line is correctly designed and ruggedly built.

Many important construction features are incorporated in Lincoln-Twin-Discs—the most outstanding being the double brush principle. The twin brushes revolve in opposite directions, causing the machine not only to do double the duty of cleaning, polishing or scrubbing, but also eliminates the tendency to whip sideways or pull away from the operator.

LINCOLN TWIN-DISC TYPE NO. 20

TWIN-DISC TYPE NO. 20

This type is recommended for the larger grade school or high school, and especially for scrubbing and polishing floors in assembly halls, corridors, gymnasiums, etc.

This model has two 10½-inch diameter brushes which revolve in opposite directions at a speed of 195 revolutions per minute. The brushes cover a total floor span of 21 inches overall. The machine is powered by a ½-horsepower heavy-duty ball-bearing motor, and has ball-bearing, sturdy construction throughout. A 5-gallon water tank with lever control for water feed, as illustrated, is optional equipment.

Average capacity of the Type No. 20 is from 2500 to 3500 square feet per hour.

LINCOLN TWIN-DISC TYPE NO. 16

This model is recommended for smaller schools for cleaning, scrubbing or polishing. It has two 8-inch diameter brushes covering a floor span of sixteen inches, yet the machine is so compact that it may be used on the smallest of areas with complete satisfaction.

Handle may be set to allow the machine to pass under low furniture, desks, etc.

Average capacity of the Type No. 16 is from 1500 to 2000 square feet per hour.

TWIN-DISC TYPE NO. 16

The small illustration below shows a Multi-Purpose sanding and refinishing wood floors in a school cafeteria

There are 12 models of Lincoln Twin-Disc Floor Machines — one of which will fit your requriements exactly.

WRITE TODAY FOR COMPLETE DESCRIPTIVE CATALOG AND DETAILS OF FREE TRIAL OFFER

THE LINCOLN COMBINATION SCRUBBER AND WATER PICK-UP MACHINE

The "2 in 1" machine automatically releases a solution of soap and water through the center of the brushes, which thoroughly scour and scrub clean the dirtiest of floors; then it completes the job by picking up all grit and dirty water, leaving the floor clean and dry.

The entire tank and squeegee assembly may be detached in a few seconds if desired and the machine may then be used for polishing. An automatic reel for extension cable is also provided to keep the cord off the floor.

The Combination covers a span of 22 inches overall. Brushes are driven at a speed of 195 revolutions per minute by a ½ horsepower heavy-duty, ball-bearing motor.

Clean water and dirty water tanks are each 7½ gallon capacity. Squeegee automatically conforms to uneven surfaces, insuring clean pick-up of dirty water.

Average capacity placed at 4000 to 6000 square feet per hour, but has consistently scrubbed more in corridors and halls.

COMBINATION SCRUBBER AND WATER PICK-UP MACHINE

CONTINENTAL CAR-NA-VAR CORPORATION

Brazil, Indiana

CAR-NA-VAR THE PERFECT FLOOR TREATMENT

FLOOR ENGINEERS AND STOCKS IN PRINCIPAL CITIES

Compounds for Conditioning and Maintaining All Types of Floors

Main Office and Factory—Actual Photo; Not a Drawing

TRI-C PRODUCTS

A complete line of treatments for conditioning and maintaining all types of floors. Made from formulae resulting from years of experience and scientific study. Special processing machinery insures perfect emulsions and superior products. Approved by leading floor manufacturers.

MANUFACTURING FACILITIES

We have been manufacturing floor treatments for many years and are, today, the largest manufacturers in the world specializing in floor treatments for large floor areas. Our large modern factory covering 100,000 sq. ft. of floor space provides a manufacturing capacity of over two million gallons annually. The company is incorporated for $1,000,000.00 and enjoys the highest credit rating.

SERVICE FACILITIES

Our staff of over 100 floor engineers is factory trained, not only in the use of Tri-C products but in the composition and characteristics of all types of floors. These engineers are located in principal cities throughout the country and are ready to cooperate at all times with the architect and contractor.

CAR-NA-VAR

A mop-applied liquid floor treatment containing vegetable waxes, including carnauba, and a waterproof varnish gum. Perfectly dispersed by a special process. Dries almost immediately and forms a hard but pliable coating of great durability, which, when rubbed, resembles a fine varnish finish. Its hard surface is impervious to ordinary dust and traffic, is readily swept clean and requires only an occasional damp mopping to remove stubborn stains.

Car-Na-Var is suitable for treating practically all types of floors except rubber, marble, asphalt and light colored terrazzo. It is supplied in "Natural" (stainless) and in Dark Oak, Light Oak, Walnut, Cherry, Mahogany, Maroon, Green and Mission. Write for prices.

RUBBER-VAR

Similar to Car-Na-Var, but made with a solvent suitable for treating rubber, terrazzo, Masonite and marble floors. Write for prices.

A $50.00 CORRESPONDENCE COURSE IN FLOOR MAINTENANCE ENGINEERING
is offered free for a limited time to school superintendents, janitors, engineers, etc. by the
CONTINENTAL CAR-NA-VAR COLLEGE
Brazil, Indiana
The College will gladly send full details

CAR-NA-LAC

Applied like a liquid wax.....yet dries with a brilliant lacquer-like lustre .....the amazing new liquid floor treatment does away completely with polishing. Does not scratch like lacquer. Traffic mars which appear in time may be rubbed out with a dust mop!

Car-Na-Lac is remarkably durable. The lustre actually seems to improve with age. Resistance to traffic mars increases. The longer Car-Na-Lac is on the floor the better it looks. Even water has no effect. Car-Na-Lac is practically waterproof. Easy to apply—just flow it on. Car-Na-Lac levels itself out without streaking. The ideal treatment for any floor. Prices on request.

CAR-NA-SEAL
(Contains Bakelite)

A deep-penetrating seal for wood floors—tough as leather yet thoroughly pliable—that gives a smooth, satin-like lustre, free from streaks and scratches. Such marks as may appear are readily rubbed out. Preserves the floor by excluding moisture and dirt from the pores while protecting the surface from rough usage.

Although used frequently as an undercoater for Car-Na-Lac and Car-Na-Var, Car-Na-Seal is an ideal top-dressing for gymnasium floors. Provides a firm, safe-footing. No danger from slipping. Will not rubber-burn. Marks left by rubber soles easily removed with mop. Protects markings of basket-ball court, etc.

Car-Na-Seal is quickly applied with a lambs wool mop. No buffing is required. First coat covers 300 sq. ft. per gallon; 2nd coat 600 sq. ft. Original treatment of two coats is usually sufficient for entire season. Send for prices and further details.

SEAL-VAR

Used as a seal on porous or oil-soaked floors preceding Car-Na-Var, Car-Na-Lac or Rubber-Var. Dries hard in about one hour. Prices on request.

CLEAN-O-SHINE

Am amber colored, semi-liquid neutralizer and cleaner with pure linseed base having an approximately neutral solid content of 22%. Write for prices.

DE-TER-GO

A cleaning powder which is sprinkled over the wet floor and allowed to stand until dissolved. Scrubbing or mopping then removes the oil and dirt from the floor providing a thoroughly clean surface for treatment. Write for prices.

Silent Chief Floor Machine

MAINTENITE

A cleaning powder especially for rubber floors. Milder than De-Ter-Go and recommended by Rubber Manufacturers Association, Inc.

SILENT CHIEF FLOOR MACHINE

A powerful, silent electric floor machine of highest efficiency. Safety switch. Sizes 15 in. and 18 in. Manufactured and guaranteed by us. Polishes, scrubs, sands, etc.

GENERAL FLOORCRAFT, INC.

333 Sixth Ave., New York City

THE *Noiseless* GENERAL FLOOR MACHINE

• *Always Quiet* •

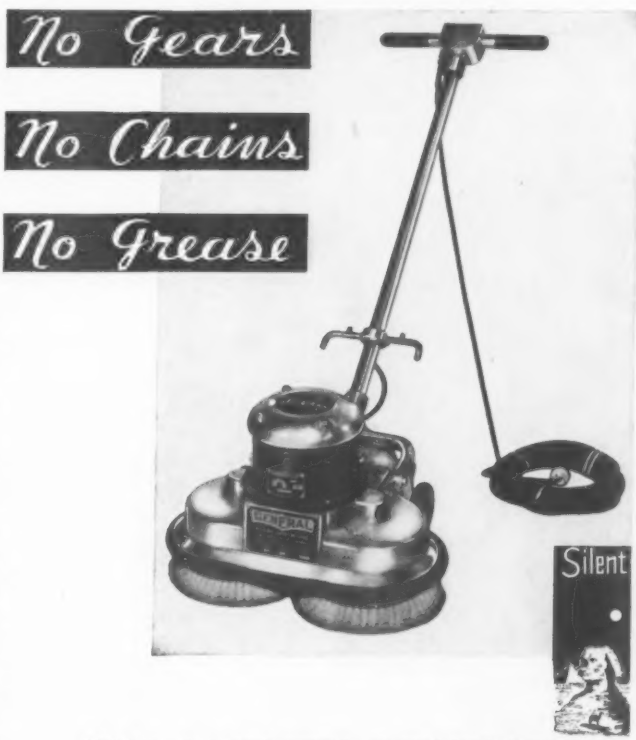
The Noiseless General Floor Machine makes it possible for you to maintain your floors with a minimum of physical effort, yet with greater thoroughness and efficiency than ever before—greater efficiency, because of its increased brush speed and entire concentration of weight directly over the brushes.

The noiseless feature is of particular importance in any school building, because this means that the machine can be run at any and all times without disturbing classes. It is guaranteed not to develop any more noise than the soft purr of the motor and the swish of the brush on the floor.

With the Noiseless General, all types of floors, new or old, can be scrubbed, waxed and polished, or refinished. The various types of brushes and attachments that can be used with this modern machine enable you to maintain your floors in perfect condition at all times and at a minimum cost.

The New York City Board of Education in 1934 purchased 27 Noiseless General floor machines on one order. Here are some of the reasons why:

1. **Permanently Noiseless Operation**
   The only floor machine made and sold with such a guarantee. Will not develop any more noise than the soft purr of the motor and the swish of brushes on the floor.
2. **Simplicity of Construction**
   Eliminates completely all expensive and complicated mechanical parts such as gears, chains, worms, sprockets and universal joints.
3. **Ease of Operation**
   Can be operated by anyone with extreme ease of control and without fatigue or strain. Glides over floor in any direction without forcing.
4. **Entire Weight on Brushes**
   Entire weight of machine is concentrated directly over the brushes where it should be for maximum efficiency of performance
5. **High Brush Speed**
   Exceptionally high brush speed assures maximum results in quality and amount of work performed. Will not splash.
6. **Brush Spread**
   Combination of both large brush spread and narrow brush width, is a real pleasure and advantage. It can be used with greater efficiency in both large areas and in smaller spaces where larger single brush machines cannot be used.



Model 14 (14″ brush spread) for small institutions.
Model 18 (18″ brush spread) for all size institutions.
Model 22 (22″ brush spread) for larger institutions.

7. **Getting into Corners Easily**
   No need to neglect corners or do them by hand. The Noiseless General gets right into them where larger single brush machines fail.
8. **Transmission Adjustment**
   Extremely easy for anyone to adjust the General Multi V Belt tension for slack or wear. Just two screws on outside of machine does it.
9. **Automatic Handle Switch**
   This is standard equipment on the two large models and assures complete and perfect control at all times.
10. **Adjustable Handle Height**
    Ample adjustment for height of tall and short operators assures convenient operating position, thereby eliminating possibility of fatigue and strain.
11. **Power Loss Elimination**
    Power losses as a result of the use of gears, chains, etc., are actually utilized in direct floor work, thereby effecting real economies in current consumption.
12. **Two Year Guarantee**
    Simplicity of construction and high grade quality of material make it possible for us to extend to our users a much longer guarantee than is available with other makes.

INVINCIBLE VACUUM CLEANER MFG. CO.

Dover, Ohio, U. S. A.

"Invincibles Clean the Educational World"

Schools, colleges, churches, theaters, and public buildings throughout the world are using Invincible Portable Vacuum Cleaners with complete satisfaction and economy. Their powerful suction gets all the dust and dirt; their sturdy construction assures long wear even with the hardest of usage; their portability allows them to be moved quickly and easily wherever needed.

All Invincibles are equipped with the exclusive Invincible Dust Separator which thoroughly separates all dust, dirt, litter, and abrasive material from the air before the air passes through the fans. Therefore there is no wear on the fans or working parts and only clean air is exhausted. All dirt is collected and securely held in one easily emptied container.

A wide assortment of tools is offered. Ask for equipment sheets.

The Invincible All Service

Illustrated below—

This model, lighter in weight than the "Universal," is a remarkably efficient cleaner at a surprisingly low initial cost and economical operating cost. It embodies all the superior Invincible features—lightness, compactness, perfect balance, extreme portability, and ease of operation.

The tremendous pick-up power of this model, in spite of its comparatively light weight, compels complete removal of destructive, imbedded dirt as well as surface litter.

There are no exposed or inflated dust bags. Only clean air is exhausted.

Motor—½ hp.	Height—19 in.
Suction—22 in. water	Width—12 in.
Volume—97 cu. ft. per min.	Weight—42 lbs.

The Invincible Universal Portable

Illustrated above—

Compact, light in weight, and designed for easy portability and quick, thorough cleaning, this machine has proved itself worthy of the name "Invincible" in many of the best schools and public buildings in all parts of the world.

Mounted on its swivel-wheeled, rubber-tired carriage, it is extremely portable, being pulled along by the hose and taken up and down stairs with little effort. It is equipped with a generous size metal dust container in which all dirt is separated from the air and securely held in one easily accessible dust receptacle. There are no exposed or inflated dust bags, no screens to clean, no buckets to empty. No dust nor dirt of any kind ever touches the fans or mechanical parts of this machine.

More cleaning power is developed by this machine than any other of equal horsepower. It works equally well on carpet, rubber, linoleum or bare floors.

Motor—¾ hp.	Height—37 in. over-all
Suction—42 in. water	Width—23 in.
Volume—135 cu. ft. per min.	Weight—70 lbs.

Other Models

The Invincible Heavy Duty Portable

Volume—155 cu. ft. per min.	Weight—250 lbs.
Suction—52 in. water	Motor—1 ½ hp.

The most powerful general cleaning machine on the market today—used in large school buildings where thorough cleaning must be done with the greatest speed, at the least possible cost.

The Invincible Light Portable

Suction—45 in. water	Weight—160 lbs.
Volume—145 cu. ft. per min.	Motor—1 hp.

Used by many schools requiring more pick-up power and a larger dirt receptacle than is obtainable in the "All Service" or "Universal" models, yet less expensive and lighter in weight than the "Heavy Duty" model mentioned above.

Complete specifications and quotation on any model will be gladly given if requested. A wide assortment of tools is offered. Ask for equipment sheets.

THE LLOYD-THOMAS CO.

APPRAISAL ENGINEERS

EXECUTIVE OFFICES

4411 Ravenswood Avenue, Chicago

New York	Detroit	Milwaukee	Memphis
Cleveland	Indianapolis	Minneapolis	Denver
Pittsburgh	Atlanta	Des Moines	Los Angeles
Cincinnati	Birmingham	St. Louis	

A PUBLIC TRUST

School Boards are entrusted with the conservative and economical management of public property in which every member of their community is interested. Should this property be destroyed by fire or tornado, the loss must be recovered through insurance. Insurance to protect must be adequate. A contract with an insurance company should call for the payment of a sufficient sum in the event of a loss to reimburse for the actual cash value of the property destroyed. It is apparent, therefore, that before the proper amount of insurance can be provided, it is first necessary to determine the true value of the properties which are to be protected.

A detailed appraisal will provide this protection, eliminating uncertainty and guesswork. An insurance contract is not a contract to pay a specific amount of money. The amount of indemnity received is regulated entirely upon the ability of the insured to prove a loss. To prove a loss it is necessary to furnish a verified and disinterested schedule of the value of the property. This an appraisal provides.

A saving can be effected in the cost of insurance by the placing of co-insurance, but this can be done safely only with accurate knowledge of property values. Frequently it is possible by reason of the reduced rates resulting from the co-insurance clause in a policy to save more in the first year than the cost of an appraisal.

Following are quotations from recent letters from clients, whose names we shall be glad to furnish:

"Our greatest savings on this appraisal are derived from our insurance, on which we have saved a considerable sum."

"We are pleased to advise you that your service in the preparation of the appraisal which you made for us has cost us nothing, as the saving that we have been able to make in our insurance premiums has more than offset the cost of the appraisal."

Our service has been used by schools and institutions for educational purposes for many years. We have appraised in excess of $750,000,000 worth of property of that character. Among those whom we have served are the following:

Boards of Education—Rock Island, Springfield, Waukegan, Illinois; Evansville, Indiana; Sioux City, Iowa; Battle Creek, Michigan; Hibbing, Virginia, Minnesota; St. Joseph, Missouri; Chillicothe, Zanesville, Ohio; Huntington, Wheeling, West Virginia; Marinette, Wisconsin.

Other Institutions—Lewis Institute, Presbyterian Theological Seminary, Chicago; Sisters of Providence, Terre Haute; Order of St. Benedict, Collegeville; Missouri Schools of Mines and Metallurgy, Rolla; Principia School, St. Louis; University of North Dakota, Grand Forks; University of Dayton, Dayton; Dennison University, Granville; Wilberforce University, Wilberforce; Texas Christian University, Fort Worth; Carroll College, Waukesha.

Upon request we shall be pleased to submit complete information concerning our methods and the savings which can be effected through co-insurance in conjunction with our detailed appraisals.

THE REID-WAY CORP.

4000 1st Avenue

Cedar Rapids, Iowa

Reid-Way

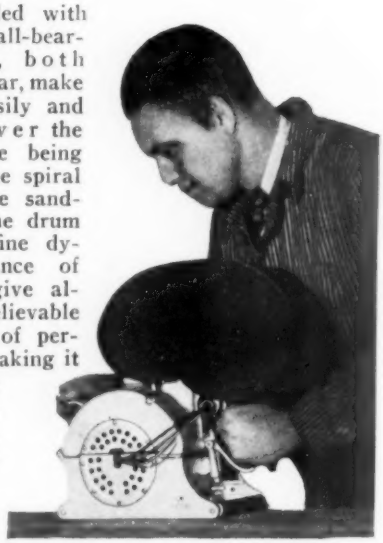
The Reid-Way Whirlwind Sander is a unique application of electric power to one of the most arduous of jobs—the scraping and sanding of wood or metal. It has been put to many uses in schools and universities—on desk tops, table tops, blackboards, chairs, small closets, stairways, in fact, wherever a plane can be used; and it is also a handy and valued tool in the school shop, where it will sand and quickly bring to a beautiful finish all kinds of articles made in the shop.

Attach a handle to the Reid-Way Whirlwind Sander with two thumb screws, and you have a competent floor surfacing machine—one that is easily carried in one hand, plugs into any convenient light outlet, and works right up to the baseboard on both sides.

Or, if there is a large amount of floor surface to be cared for, we suggest a special model for the purpose—the new Reid-Way "8" illustrated in the lower right corner of this page.

SPECIAL FEATURES

The Reid-Way Whirlwind Sander has but one moving part—the high-speed sanding drum. It is easily guided with one hand. Ball-bearing rollers, both front and rear, make it glide easily and smoothly over the surface being sanded. The spiral wrap of the sandpaper on the drum with the fine dynamic balance of the drum give almost unbelievable smoothness of performance, making it possible for even a novice to produce a first-class job.



The Reid-Way Whirlwind Sander is handled just like a plane. Note the comfortable grip and handy lift in front—it fits the hand without fatigue. It requires only sixty seconds' time to change the sandpaper, and the Reid-Way drum carries twice the usual amount of sandpaper so the change is made only one-half as often

Invert the **Reid-Way Sander** as shown above for edging and sanding all small stock

Reid-Way Motor Sanding Drum

Note the long spiral wrap of the sandpaper about the drum, allowing one continuous, smooth surface of abrasive—no break where the paper clamps into the drum as with the ordinary type sander. This feature means remarkably smooth performance

This is the new **Reid-Way** "8"—a floor surfacer of amazing stamina and speed

THE SPENCER TURBINE CO.

Hartford, Connecticut

THE SPENCER CENTRAL VACUUM CLEANING SYSTEM

The Spencer Central Vacuum Cleaning System has met with the approval of architects and engineers everywhere, and has been installed in more than 10,000 buildings, including more than 1500 school buildings.

Cleaner Schools—For school buildings, the Spencer Central System has introduced a new standard of cleanliness. Numerous tests have demonstrated that the Spencer System removes 25 to 50 per cent more dirt in pounds under similar conditions than other methods.

No Dust—The Spencer Central System removes dangerous dust. Even the finest dust is drawn in by large volumes of air under heavy vacuum and goes down to a container in the basement.

Speed—The Spencer Central System saves time. The Spencer System usually shows a saving of 20 to 30 per cent of the operator's time on bare floors. In cleaning other parts of the school building, however, such as rugs, walls, chalk trays, etc., there can be no comparison. If the janitor were to attempt to clean these parts as well as the Spencer Central System does, it would require two to ten times as much work!

For Cleaning Erasers and Chalk Trays—The Spencer Central System, instead of scattering the great bulk of the chalk dust on the floor, provides a method of cleaning erasers and chalk trays that is rapid, sanitary, easy and thorough. The janitor has only to attach a special tool and move it across the surface of eraser or chalk tray.

Cleans the Boiler Room—This system cleans boiler room floors—removes dust and soot from pipes and draws soot out of the boiler tubes, often saving the whole cost of operation in this one item alone.

Swimming Pool Cleaning Equipment—By means of special cleaning tools usually employed in connection with the pump on the filtering system it is possible to remove accumulated sediment from swimming pools without the waste of water involved in draining the pool. Bulletin on request.

Booklet—A number of Spencer-cleaned schools are illustrated in our booklet, sent on request.

Heavy Duty Portables—A new light weight portable vacuum cleaner using the same type of vacuum producer and the same tools is available at low cost for small public and private schools. Demonstrations available on request. Write for the pamphlet.

CLEANING FLOORS

REMOVING CHALK DUST

CLEANING ERASERS

THE TROPICAL PAINT & OIL COMPANY

General Offices and Factories
1208-1250 West 70th St., Cleveland, Ohio

Special Paints for Schools

For years we have specialized in the manufacture of Paints, Enamels, Varnishes and Roof Coatings for the protection of large buildings. During this time we have developed many coatings for educational institutions.

Our whole energy is bent toward the improvement and development of our maintenance products. It pays to buy from specialists like ourselves, because you are sure of getting the most suitable coating for every surface and one which will give long wear and satisfaction.

The Tropical Surface Saver

From an advertisement in *The Saturday Evening Post.*

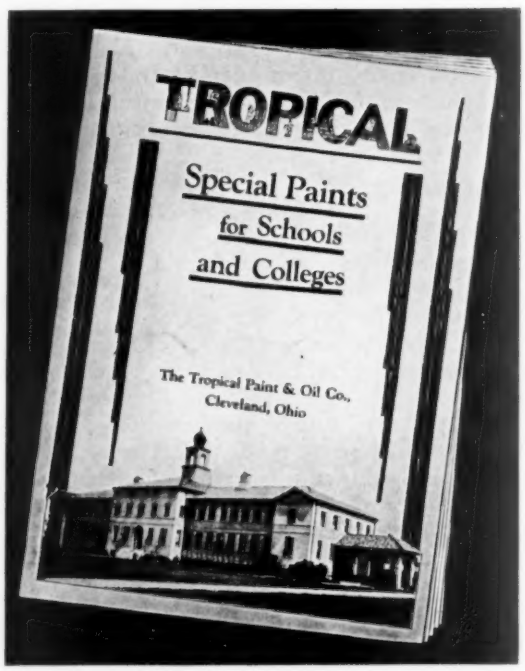
We maintain a staff of men covering the whole country, who are known as "Tropical Surface Savers." They have been trained in paints and painting problems and know how to analyze painting conditions.

The "Tropical Surface Saver" in your locality will be glad to apply his knowledge to your problems. This is a service of which you can avail yourself free of charge.

Book Sent Free to School Officials

The book pictured here is given free to school officials. It was designed especially to help those who are responsible for the maintenance and upkeep of school buildings.

In its pages you will find information about protecting and decorating difficult surfaces like swimming pools, shower rooms, laboratories and toilet rooms. It also contains pictures of many educational institutions where Tropical Protective Coatings are now in use, and descriptions of those products, which are designed for school buildings.



Another useful feature of this book is an alphabetical index of all surfaces that need protection around educational institutions, and opposite each is the name of the Tropical Product that is designed to decorate and protect that particular surface.

This book will make a valuable addition to your information file. A copy will be sent free on request.

Section IV

THE PLANNING AND PLANTING OF GROUNDS

The Landscape Architect's Part in Planning Colleges and Schools

BY HENRY V. HUBBARD AND LEON HENRY ZACH
OLMSTED BROTHERS, BROOKLINE, MASS.

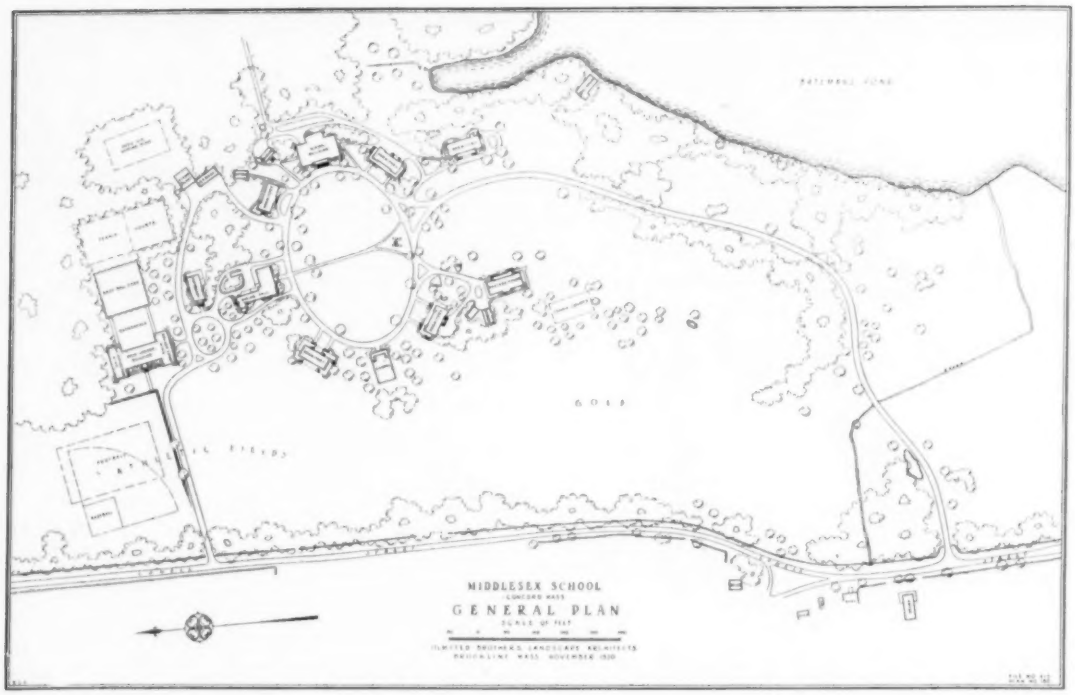
WE are told that what the Senior Olmsted meant when he termed himself a landscape architect was that he was striving to be "a master artisan in matters pertaining to land and human works thereon, having regard both to the beauty of its appearance and to its use." Again, "Regard for beauty," F. L. Olmsted, Jr., has said, "must neither follow after regard for the practical ends to be obtained nor precede it, but must inseparably accompany it."

The Esthetic and the Utilitarian in Landscape Design

When the landscape architect considers the problem of institutional development, he thinks first in terms of allocation of areas to uses. He studies on the plan and on the ground the size and the relations of the spaces which must be occupied by buildings, by a campus, by athletic fields, and by all the various related activities of college life. But he cannot do this without taking into account the objects as well as the spaces. He thinks about the buildings not only as beautiful examples of architecture, both in themselves and in their groupings, and as efficient housing for the practical requirements, but also as elements of a total landscape composition in which ground forms and vegetation are also a part, sometimes a dominant part. He assigns bulks or masses of architecture and vegetation to their proper locations in relation to one another and to the land on which they are to be placed.

The landscape architect has been trained throughout his schooling and throughout his practice to think and to feel in terms of ground forms and of natural beauty. This ability is perhaps his most distinctive contribution among the contributions of various trained advisors who may have their important parts in the development of the scheme. This contribution is particularly valuable in school and college design, where frequently the fitness of the development to the character of the landscape and to the esthetic suggestions and opportunities which it offers is the greatest final test of its excellence.

On the utilitarian side the landscape architect considers circulation between areas, between groups of structures, and between buildings of a group, giving due thought not only to economy of handling of supplies and to efficient movement



of people from one building to another, but also to the effect upon the landscape of the roads and paths that form the circulation system. He considers the location of buildings with a mind not only to the economy of balanced cuts and fills, but also to the beauty resulting from artificially produced ground forms about the buildings or elsewhere that shall be consistent with the natural areas remaining unchanged.

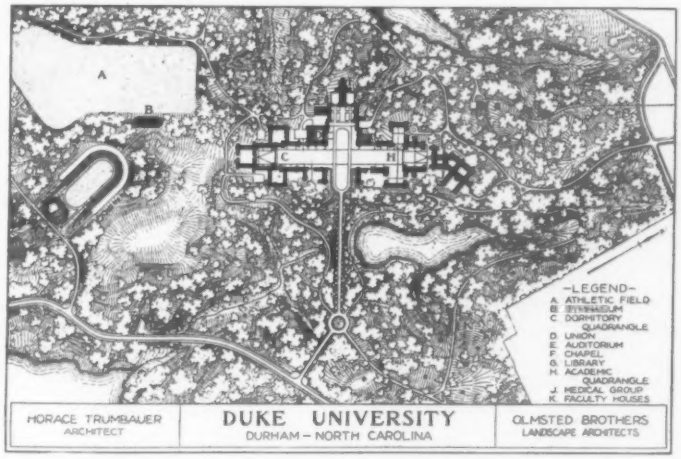
In the landscape architect's mind, however, the utilitarian matters of grading operations and road construction would probably be of somewhat less weight in the first determination of the problem than the esthetic considerations of locations of buildings in relation to the topography and to each other. The main relations of the proposed scheme are shown on a general plan of development on which the landscape architect may collaborate with architects and engineers, but which he often begins alone, because these main relations of mass and area come before detailed considerations of construction, whether architectural, engineering, grading, or planting.

Ultimate Size of the Development

Whether the problem is the development of a new site or the enlarging of an old layout, one of the first matters to be determined is the probable ultimate size of the development. This is necessary even if the immediate question is the placing of only one building. No single unit can properly be located without thoughtful consideration of future development, for fear that its location may in later years be found to be awkwardly in the way of further growth. The limit of the development may be fixed in terms of a given number of students by charter or by legislative action in the case of a state institution or arbitrarily by the administrative board of the institution, but when no limit of students has been set, some limit of development must be determined for purposes of design even though it is obviously subject to change.

Records of the institution's past growth of course are helpful, but must be considered in connection with parallel records of the increase in population of the area tributary to the institution, whether this area is local or wide, and with records of trends in local industries or business that might affect the neighboring populations. Locations and sizes of other educational institutions of the same kind and their rates of growth may have a bearing upon the local problem. The present financial condition of the institution and its probable financial future will of course be large factors in deciding the ultimate size of development to be reasonably sought. Land values have more than once been a controlling factor; an institution in a city may find it prohibitively expensive to add to its acreage and be tempted to move farther out in return for the value received for the sale of its intown property. A notable example of a shift of site necessitated by physical inability to expand in a large city is that of the Massachusetts Institute of Technology, whose move from a few crowded blocks in Boston to a spacious area on the Charles River in Cambridge brought recreational facilities and housing

opportunities which the intown site sadly lacked. Louisiana State University moved to a 2,100-acre site three miles from its original location in Baton Rouge. Newcomb College moved from a single block in the center of New Orleans to a new site on the outskirts of the city near Audubon Park, comparatively "in the country."



The Demands of Future Uses

With the limit of the number of students at least tentatively determined, the next important consideration is that of the relative demands of uses to which structures and areas are to be put, and the determination of which uses are to be permanent elements and which should be provided for in a flexible way because they may change in the future.

For instance, as a first step in solving a new problem, Olmsted Brothers have from time to time learned from questionnaires to institutions of comparable size and character the relative floor areas of buildings and areas of land devoted respectively to such different uses. This is followed up by seeking from heads of departments in the institution in question their best guesses as to the probable space needed by their departments when they reach the ideal for the estimated maximum number of students. The area of different classes of structures depends to some extent upon the permissible number of floors; the latter is in turn dependent not only upon the kind of use, but also on the architectural style. This style may be determined by the style of existing buildings in the case of old institutions, or, in the case of new sites, by special fitness to new requirements. Bulks of structures are nowadays figured on the basis of unit areas per student; from many examples in recent experience, fairly consistent units have now been arrived at for this purpose for the various kinds of structures. Using these unit figures and depending on the style of architecture and the number of floors permissible for structures of a given use, the bulk is determined. The size of such structures as classroom buildings, libraries, and gym-

PHILLIPS ANDOVER ACADEMY
Photograph of part of model of grounds; Olmsted Brothers

nasiums is affected by rotation of use, while the size of such units as dormitories must usually be ample to accommodate the total number to be housed by the institution at a given time.

Sizes of two-dimensional use areas, such as athletic fields, may also be determined by standard units per person, but the irreducible minimum area that will answer the purpose is usually, and should be wherever possible, increased in so far as surplus land exists or can be added after structures and minimum recreational needs have been taken care of.

The final result of studies of this nature is the determination of the total ultimate volume of space and area necessary for various uses—academic, housing, recreational, social, and administrative. Upon the basis of this information, the general plan for the institution may be prepared.

A General Plan Essential

There is in this comparatively enlightened age little hesitation on the part of college and school authorities in admitting that a general plan of development is the essential source of assurance that the final picture will be an orderly one: one of beauty in the relation of structures with each other and with their surroundings; one that will redound to the credit of the institution and to the community of which it is a part; one that will be a source of inspiration to the student who is to live and work within the sphere of its influence. Order is "the first law of knowledge and it should be the first law of institutions whose business it is to discover and to disseminate knowledge . . . [it] . . . is the guiding star under which a development plan is desired, conceived and followed. That the group of buildings shall not be a motley jumble of structures so located as to be at odds with each other, displaying discordant styles, erected at haphazard, confusing to beholders and irritating to occupants, but rather that it should be a homogeneous, clearly to be apprehended scheme, in which there is a studied and happy balance of things, of buildings located with regard to their functions, importance and architectural effect, of natural views conserved and topographical advantages skillfully exploited." *

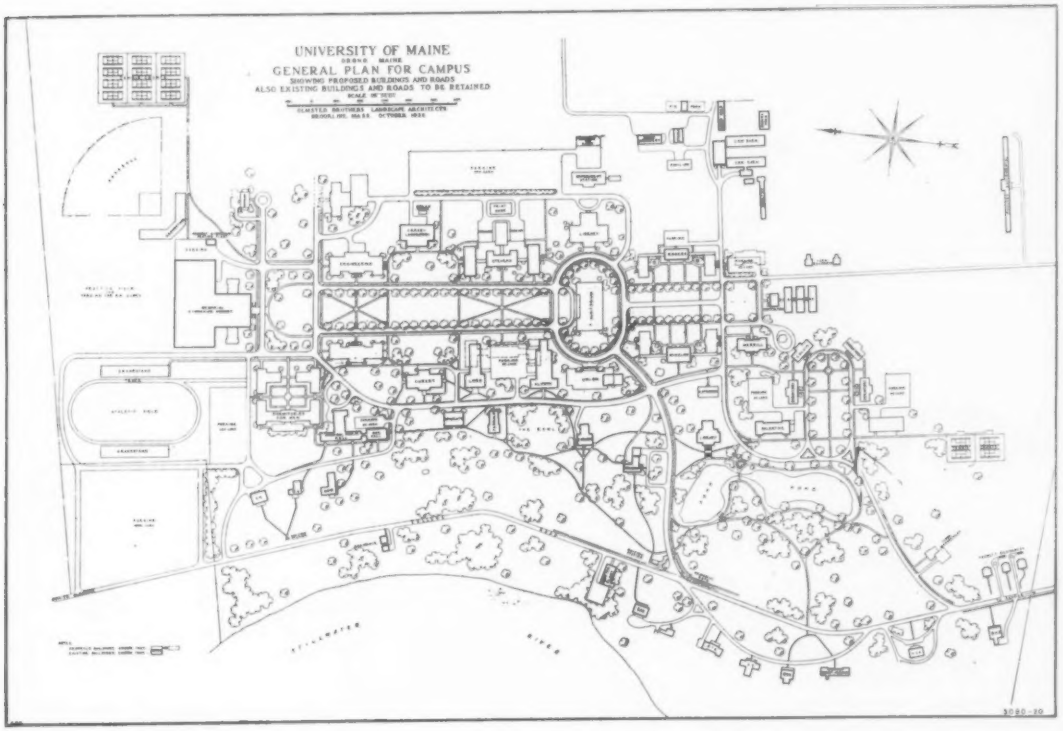
In the placing of buildings there are certain types of structures which are normally chosen for certain kinds of locations. The dominating building sites should obviously be retained for those units which express and can be relied on permanently to express the "soul of the institution" rather than for those whose use may easily change, thereby entailing a different appearance or a different size that might not be suitable for the site. Among the comparatively permanent structures are chapels and libraries and in some cases administration buildings. Of the flexible types are classrooms and dormitories. The latter groups must obviously be located where expansion is possible without interference with other groups, while the permanent units like the administration buildings, chapels, or libraries may be given sites which, while preferably dominant, need not be so capable of expansion. Increase by acquisition of new volumes in libraries is not normally great enough to necessitate much expansion in bulk of the main building; it may perhaps be met by the addition of stacks only, without increase in the rest of the structure, and sometimes by the transfer of books on special subjects to special libraries in other academic buildings. Central heating units, not normally likely to be subject to more than moderate expansion, may take a restricted site, central to the final total development and accessible for service, but if possible in an inconspicuous location.

* "College Architecture in America," Klauber and Wise, p. 25.

The Influence of Topography

The nature of the topography, the boundaries of the property, and the existence and location of important masses of trees are often strong influences on the kind of layout to be produced by the general plan. In cities the layout may be largely determined by boundaries dictated by street plan, producing rectangular developments where streets are at right angles and responding to diagonal streets with pieces of layout related to them. The design of the new Harvard House units is notably affected by property lines which in turn are more or less dictated by the curve of the Charles River and the approximately parallel boulevard. The nature of the existing topography may be even a stronger influence. A completely flat piece of ground, bare of trees, would probably call for a formal style of layout, perhaps symmetrical in all parts about axes either predetermined by the location of existing structures or in the case of entirely new developments determined as parts of the total scheme, long vistas at dominant structures giving the hint for main and subsidiary axes. An entirely irregular piece of topography blessed with important masses of vegetation which must obviously in the main be retained in the picture would probably call for an informal style of layout where axes are fewer and more likely to be determined by the topography or by the tree masses or by views out from the property to distant attractions of nature, as to a mountain top or river bend. There are examples, too, of combinations of formal and informal layout dictated by the topography and to some extent by the different uses of structures and groups of structures; for instance, one formal group symmetrically arranged about an axis one of whose termini is a dominant site occupied by a dominating structure, while several other groups spread informally along irregular spurs of land leading away from the formal group.

If the topography has real character, it is all important to allow it to dictate the type of development: too many sad examples are to be seen of dictation of the T-square and triangle



where formal schemes are superimposed on steep hillsides or irregular ground, causing costly grading operations that are ineffectual in producing beautiful or even interesting results. Had it not been for varying topographies, one can imagine the difficulties in creating interesting and appropriately local designs in a recent commission of Olmsted Brothers where general development plans were required for six Teachers' Colleges at one time for the state of Alabama. The conformation of the six different topographies was probably the greatest single influence in producing six completely different results, each with its individuality and interest.

Restful Formality—or Interesting Informality?

There is no answer to the question as to which is the better or the more interesting kind of layout, a formal or an informal one. The formal, on comparatively flat land or on land capable of simple organization at different levels, may produce a unity easily understood, a dignity of straight lines, a consistency of repetition between architectural forms and ground forms and trees; all helping to carry out a simple orderliness which is restful to look upon. The informal, on varied topography, produces interest by irregular changes of levels, calling for steps and walls of varying heights and types of construction, mystery from unexpected glimpses come upon suddenly, picturesque qualities and charm in relationships of existing vegetation to new structures or of structures to fine views outside the scheme. Perhaps the term informal needs definition here. Informal should not mean formless. Good informal work is usually organized in one, or frequently both, of two ways. It must in any case comprise buildings, which are formal, being rectilinear and rectangular, but these may be arranged in a scheme which, though obviously man-devised and owing its proportion to man's choice, is not predominantly rectilinear or in any way geometrical. On the other hand, an informal scheme may owe its organization to a following, both esthetically and economically, of natural ground forms, so that the dominant unity is nature-inspired and not man-invented. This type of unity, well handled, can be as powerful as complete formality, while much less likely to be rigid or monotonous. The informal also allows of greater freedom in design, resulting in interest of variety as to architectural handling and in greater ease in solving practical problems of service, access, etc.

Flexibility in the General Plan

The preparation of the general plan of development, whether in collaboration with the architect or before the architect is called in, is only the first phase of the work of the landscape architect. Any general plan should be on the whole flexible and accepted in principle only; for varying social conditions and educational trends are almost sure to force certain changes upon it, and the landscape architect should stand ready, with open mind to the need for changes, to give advice

when the need shows itself. Beyond this, as actual construction is contemplated, the landscape architect is responsible for the detailed design of the grading and planting and often of the roads and surface drainage, as the architect is responsible for the buildings and the engineer for such utilities as water supply, sewerage, and electric wiring.

All these different activities are coordinated by the general plan. It usually happens that the growth of the institution is slow, unpredictable, and sporadic. The great danger is that the plan, even if it be comprehensively and prophetically made in the first place, is not kept up to date and not kept before the minds of the successive generations of builders. Then because it is not capable of being carried out specifically in some instance, the general conception for which it stands, and which is still sound, is stultified by some thoughtless, inconsistent construction. It would be a great boon for many a college if the landscape architect and the architect who had collaborated in its first design, and their artistic heirs and competent successors in office, should be held always ready as custodians, developers, and expounders of its basic principles forever.

Planning Public School Grounds to Meet Changing Needs

BY S. HERBERT HARE

FELLOW, AMERICAN SOCIETY OF LANDSCAPE ARCHITECTS

IF education is to be considered a process of broad cultural development, rather than the mere accumulation of facts, the environment in which the process takes place becomes of increasing importance. With the trend toward this broader view, the schoolhouse and its surrounding grounds are undergoing a change. Up to the present time this change has perhaps been more marked in the improved architectural design and arrangement of the buildings than in their ground development, but gradually communities large and small are coming to realize the importance, from the viewpoints of both beauty and utility, of proper planning in school grounds; proper planning in this case meaning proper location in relation to the complete city plan, proper size, proper location of building on site, and suitable allocation of the area to various uses.

The problems which come to the landscape architect fall within two general classes. First, and usually the most difficult, is the designing or redesigning of present sites; second, which usually offers the greatest opportunity, is the development of a new site.

Choice and Improvement of Sites

Difficult as it may be, the improvement of present sites usually does offer some opportunity for careful planning, and the transformation which can be effected, even though short of an ideal arrangement, will usually be an inspiration to the community to do better things in the future. The problem often involves a more or less square building of unattractive architectural design, located awkwardly near the center of a bleak, desert-like plot of land of inadequate size. The first and greatest opportunity for improvement here is to extend the area. Often additional area can be acquired without prohibitive expense, and even though it may involve the vacation of a street, this is usually not serious in a residential district. The extension of the site may place the building in a more advantageous location in relation to the entire property, and permit of a more logical distribution of areas for ornamental treatment of the building approaches and playground surroundings, and for an orderly arrangement of the various types of play spaces. The walk arrangement is often poorly planned and the result of unrelated additions from time to time. A new and adequate walk system can serve the purpose of utility, and at the same time be an important element in the landscape design. Planting can often relieve the architectural lines of an unattractive building.

Thus a school which has been an eyesore in a neighborhood may become a source of inspiration for other neighborhood improvements. It may change the attitude of property owners toward their own properties, as well as unconsciously influence the point of view of future citizens toward civic improvement.

Fortunately, the newer schools in most cities are being built with the exercise of more vision, with more appreciation of the school as an element in civic life and development. It is not the purpose here to discuss the school in its relation to the city plan except to say that more attention should be given, in the average city plan, to school problems. The location of schools bears a definite relation to zoning, to the system of major thoroughfares, and to the recreation facilities of a community. Often a considerable saving in operating costs can be made by consolidation, abandonment, and relocation of school properties. Such saving may justify a considerable capital expenditure.

It is worth noting that with the broader point of view of the school as a community center is coming a realization of the more adequate area needed for ground development. Sites of five to ten acres are common for grade schools, and ten

to twenty acres or more for high schools. Such sites offer the possibility of complete recreation facilities, as well as suitable ornamental area. The result, with proper planning, can be in effect a neighborhood park. Intelligent planning of the grounds of course is as necessary as planning of the building. Neither economy nor efficiency, not to mention beauty, can be accomplished without it; and the element of beauty should be properly woven into the practical solution of the problem, not a thing apart, or an affectation. The three elements, economy, beauty, and efficiency, are not incompatible.

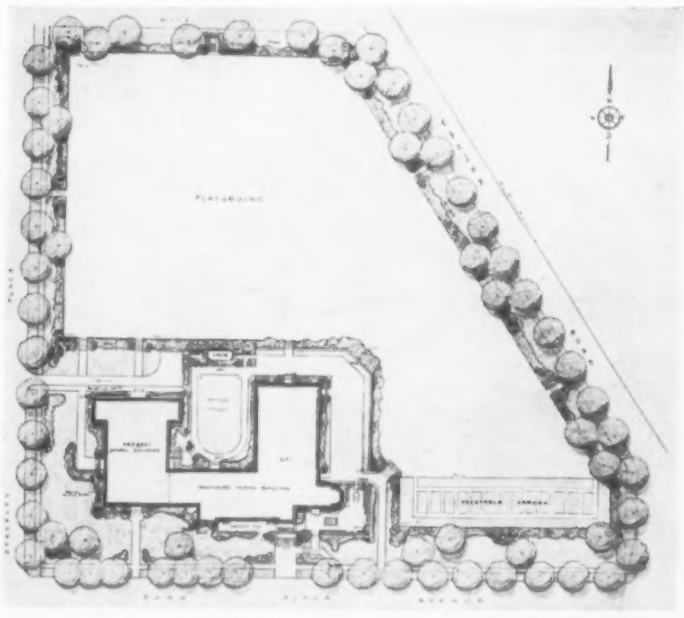
In addition to the proper location in relation to the city plan and the other units of the school system, the individual site should be selected with careful consideration of its suitability to school purposes. Favorable or unfavorable soil conditions and topography will greatly influence the cost of development. The disposition of excavated material on the site, the grading necessary to secure certain maximum slopes on play areas, the necessity for expensive retaining walls, and the preservation of existing trees, should all have consideration. The landscape architect can render a distinct service at this time, and perhaps save much money in the end.

Location of the School Building on the Tract

The first problem in designing a new school ground is the location of the building. This involves problems of space allotments to various recreational uses, walk and drive approaches and automobile parking, proper setback from streets, and orientation. It is evident that cooperation between the landscape architect and the architect is most desirable at this stage, and it is important that neither the location nor the grade of the building be decided until a study of complete landscape development has been made.

GENERAL PLAN OF NEW RIVERSIDE HIGH SCHOOL, FORT WORTH, TEXAS

Hare & Hare, landscape architects for both plans



PRELIMINARY PLAN FOR LILY B. CLAYTON SCHOOL, FORT WORTH

The building should not be located near the center of the tract. In an area of rectangular shape, a location at one end is preferable; in a square area, a location nearer one of the sides, so that the larger portion of the whole space will be uninterrupted for play. The building should be set back a reasonable distance from the street to provide for ornamental foreground. The exact distance depends on the size of the entire tract, and the height, length and form of the building. Perhaps it would be safe to say that the setback should seldom be less than 60 to 75 feet, and seldom need be more than 150 to 200 feet. Maintenance costs are important considerations in some communities, and may influence the area devoted to grass and shrubbery, and therefore the building location.

The walk system should be kept as simple as possible, with the least interruption of open lawn

areas. At the same time all main lines of traffic must be served with reasonable convenience. Walks should be of ample width, 8, 10, and perhaps 12 feet, with a minimum of 6 feet for minor walks.

Planning the Fenced Play Area

Areas used for play purposes should be definitely fenced. This is a measure of safety in preventing children from running carelessly into adjoining streets. It is also necessary for order and beauty. Without fencing it is impossible to have an enclosing border of shrubbery, so necessary to screen the barren play space from the surrounding properties. This alone can make the school grounds an asset in a neighborhood rather than an objectionable feature. The fence should be of ample height, not less than 5 feet, and should be set back from the adjoining street lines as far as space requirements for play will permit, but at least 12 to 15 feet, to provide for a band of shrubbery and some grass space. Twenty-five to 50 feet is preferable, and allows for a more interesting and informal outline of shrubbery borders, as well as better grass areas. Openings in the fence should be provided at intervals for access.

Within the fenced play area may be set aside spaces for specialized use. In the case of a high school, there will be need for tennis courts, basketball, volleyball, football, playground ball, and perhaps a quarter-mile running track and a baseball field, in addition to some general play space. In a grade school, the principal requirement is a large space for general games, with special areas for kindergarten and primary pupils. The kindergarten areas can be made features of unusual interest. They should be located in a protected situation, preferably on the southerly side of the building, and if possible with direct access from the kindergarten room. They can serve as outdoor schoolrooms. There should be some grass and shrubbery about the borders, shade, and a reasonable paved area near the center for group games. A shallow pool for fish, water plants and boats, sand courts, and a raised platform to serve as a table, are other features which may be added. The primary area, with simple apparatus such as swings and slides, may adjoin the kindergarten space, and both should be separated from the other playgrounds by a low fence; or in some cases this separation can be made by a terrace treatment with a difference in grade, and perhaps a retaining wall.

The general play space for older children should not be interrupted with apparatus. Such equipment, including back-stops for soft-ball diamonds, can be located along the edges of the area. Where space permits, garden plots, in which growing plants can be watched and cared for, are of great value. Another feature of unusual interest, which requires more than ordinary space, is an outdoor theater. It can be of endless use, during both the school year and the vacation period.

Landscape Construction and Planting

The location of the building, the general arrangement of the grounds, and the special features to be included, having been determined, problems of construction should be considered. A complete set of plans for landscape development include, in addition to the general plan for arrangement mentioned above, dimension and grading plans, sections and profiles, planting plans and plant lists, together with details for steps, walls, pools, and other minor construction included in the scheme, and specifications.

At this time the very practical problems of quantities of excavation, balancing of cut and fill, soil requirements, selection of surfacing materials, fencing, plant materials, etc., must be solved.

The determination of the finished grade at the building will control much of the grading. Proper drainage from the building, including the piping of water from downspouts to sewer or curb, is essential. Play areas should have a cross grade of not less than one per cent for drainage, and not more than two per cent, except in unusual cases, where a slope of two-and-one-half per cent may be permissible. The grading and drainage of tennis courts, football fields, and other recreation areas all present special problems. The collection of surface water in drain inlets and underground pipes is often necessary to prevent washing.

Lawn areas and shrubbery beds and tree pits should all have suitable depth of good soil, which will vary with local conditions, and all unsuitable soil and rock should be removed. A water system providing hose connections at intervals of 100 to 200 feet throughout the grounds is necessary for proper maintenance, and a complete sprinkling system may be essential, under some climatic and soil conditions, for lawn and shrubbery areas.

Playground surfacing is a subject for considerable study. It is doubtful if the ideal surface has yet been developed. A sand clay or gravel surface, if of properly proportioned material and well maintained, is quite satisfactory under most conditions, and the least expensive. More expensive surfaces, composed of various asphaltic mixtures, are more satisfactory under all weather conditions. Tennis courts, basketball courts, kindergarten areas, etc., should have a surface which will dry quickly after a rain, and not require too much maintenance. Flagstone or brick on a concrete base is suitable for the kindergarten children, but not for tennis or other games.

Walks and drives present another problem. For the former, at least, concrete is the most practical material, and yet, as ordinarily used, it is cold and forbidding. It can be made more interesting by developing a surface pattern, with troweled groovings through a field of brush or float finish. A light-buff color can be made per-

manent and is preferable to the cold gray. A more interesting result can be secured by using a suitable aggregate, and then washing out the surface to expose the aggregate and produce a texture. In the recent work at the University of Texas, an aggregate composed mostly of the native Colorado River gravel, containing a considerable percentage of red granite, and in size of ¼-inch to ½-inch, was used. At the William Rockhill Nelson Gallery of Art and the Atkins Museum of Fine Art in Kansas City, Mo., an interesting walk was produced with Muscatine (Iowa) gravel for the fields and red granite and green marble chips for borders and patterns. The work requires skill, and is more expensive than ordinary concrete, but probably less than brick on a concrete base, or flagstones, such as were used to good effect recently with CWA labor in a portion of the school improvement program in Fort Worth. Brick on a concrete base is a satisfactory material, and offers great opportunity for the use of patterns in the design.

Pools, walls, drinking fountains, and other minor structures all offer opportunities in design and material to lend interest in detail to the general scheme. They should not be passed over too lightly, but given as conscientious study as the whole arrangement.

Trees, shrubs and other plants should be chosen for adaptation to the site and climate. The use of suitable native material should be encouraged, but at the same time the choice should be extended to include plants in general use, so as to promote the educational value. Plants of an exotic or garish character, the use of which is generally considered bad taste, should not be included.

Supervision of the work by the landscape architect is essential to the best results. It is even more important than in the work of an architect. It is more difficult for the landscape architect to show definitely all phases of his work on plans, and many refinements in grade and alignment can usually be made to advantage on the ground.

The Importance of Adequate Maintenance

It is effort wasted to develop a system of well-planned school grounds and fail to provide adequate maintenance. The janitor in most cases has a limited time to devote to ground care, as well as a limited knowledge of the requirements. Some central control is necessary for uniform results. The most efficient method probably is a central crew or series of crews, properly equipped to do mowing, trimming, spraying, rolling and playground surface repair. Such crews can rotate around the school system and avoid duplication of equipment. Watering, and some cultivation, as well as sweeping and general cleaning-up, might be left to the janitor, working under supervision and instructions.

An ideal situation in cities where there is a spirit of cooperation between the school board and the park board, is a working arrangement whereby the park board, with its trained personnel, takes over the responsibility, under a suitable financial agreement, for the development and maintenance of school grounds. Such an arrangement has recently been worked out in Fort Worth, Texas, including also joint services of the consulting landscape architects. About fifty school grounds are being improved or developed under this program.

A logical extension of such an arrangement is provision for cooperative supervision of recreation. This involves the cooperation of the recreation boards, in cases where they operate separately from the park boards. With collaboration of park, recreation and school officials, in the de-

THE LANDSCAPED GROUNDS OF A HIGH SCHOOL IN WICHITA, KANS.
Hare & Hare, landscape architects

velopment and maintenance of grounds and play supervision, complete coordination of recreation facilities can be accomplished. The sympathetic interest of principals, teachers and parent-teacher organizations, as well as pupils, can make the picture complete.

Experience with the development of grounds around public buildings has proved that beauty of landscape setting strikes a responsive note with the average citizen. With adequate area, and intelligent planning and development of school grounds, and proper maintenance, schools will be considered a distinct asset rather than a liability in a residential district.

The Care of Trees on School and College Grounds

BY MARTIN L. DAVEY

YOU may not like it—or maybe you will—but anyway there is a shrewd old saying that runs something like this: "Show me the grounds of your school and I'll tell you the kind and character of the people behind that institution."

If you think it over you will agree that there is a quality in nature-loving people that shows itself in their thoughts and impulses. He who loves the beauty of nature somehow receives more happiness for himself and seems to radiate something fine to the world about him and to those associated with him.

Whether they grace the grounds of schools or the borders of dingy streets, there is a beauty to trees that stimulates man's spiritual nature. There is a fine dignity about them that stirs the imagination, and a ruggedness that seems to reflect a nobility of character. Those who live and work among trees receive a type of spiritual stimulation that brings out the best in them and helps to make them finer and better citizens.

Treeless schools—and there are some—have much the same atmosphere as treeless homes. The architecture may be fine, but barren, sunbaked, treeless grounds are uninviting and desolate. If there is anything in the idea that pleasant, quiet, attractive surroundings foster better work and effort, then school trees do have a definite value. Whether for private schools or for schools that are operated by the national government, the state, the county, or the individual city or village, it is simply a matter of good business to have school grounds that are filled with the fine shade and the beauty of well-kept trees.

Transplanting Large Trees

Nowadays, when a school building is being erected, it is possible to salvage fine, mature trees which, a few years ago, might have been cut down as being too large to transplant. The pictures on page 165 show how a new and lower ground level was established in connection with the building of a school in Peoria, Ill. Following plans worked out by Arthur Vernon Coale, landscape architect, the trees were lowered to the new

THE ROOTS OF THIS FINE, IDEALLY LOCATED ELM WERE BURIED WITH EARTH DURING THE CONSTRUCTION OF A COLLEGE BUILDING, AND THE SUPPLY OF AIR TO THE ROOTS THUS CUT OFF. A YEAR LATER THE TREE LOOKED AS IN THE PICTURE AT THE RIGHT

THE MOVING OF A LARGE ELM

large, attractive tree specimens is now definitely on a practical and efficient basis, if the men doing the work are properly equipped and thoroughly trained. It is no longer necessary to wait a lifetime before plantings will reach a size where they provide the permanent beauty and shade that can be given only by mature tree specimens.

Securing Proper Growing Conditions

Inspection of existing trees on school grounds will show that many are suffering from lack of care. Nature developed trees primarily for forest conditions where the soil is soft and porous, where vegetation shades the ground from the direct sun's rays, where a mulch of spongy leaves and litter holds the moisture, later decaying to restore to the soil the food elements which the tree roots are steadily exhausting. Forest trees grow close enough together to shield each other from the shattering forces of many storms. Birds are plentiful enough to subdue many of the insect pests that are destructive to city-grown trees. When trees are removed from the natural growing conditions which the forest offers, and are placed in rather artificial city and lawn conditions, it is to

grade and spaced more attractively than before. The "after" picture, taken the following summer, shows the very pleasing results. How much better the grounds look than if the planting consisted of small nursery-sized trees.

Often trees can be temporarily moved out of the building area and later planted in a permanent location after the construction program has been completed. Sometimes certain areas of the grounds have too many trees, making it possible to transplant at least a few to some other section where trees are greatly needed. If trees are not available on the grounds, they can usually be purchased from some nearby area. In any event, the transplanting of

A ROW OF TREES THAT NEEDED TRANSPLANTING TO A LOWER LEVEL

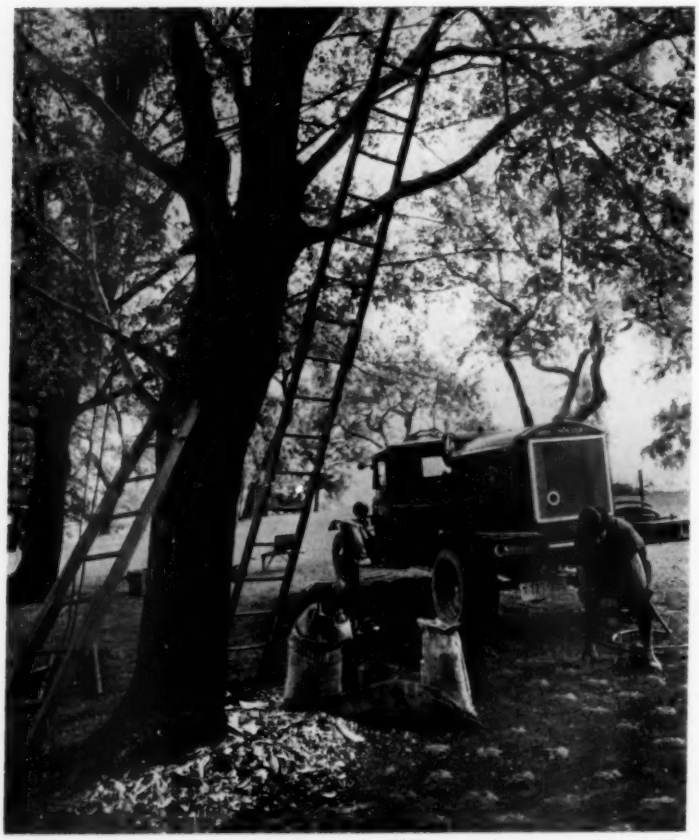
THE TREES THAT ARE SHOWN ABOVE AS THEY APPEARED THE NEXT SUMMER

be expected that special help will have to be provided if the trees are to thrive.

A good share of the trouble with many rather sickly looking trees seen on school grounds is due to unfavorable soil conditions. Often the grass, leaves, and litter are promptly raked away, permitting nothing to return to the soil to replenish the food elements. Without sufficient food the trees decline, dead branches appear, vitality lags, and before long the health of the tree is so precarious that death is in sight. The feeding of starving trees is of course essential. Soggy, poorly drained soil, too dry soil, hard-packed soil that excludes air, fills of earth which shut out the air from the roots, are among the things that commonly cause death, although all these situations can be corrected if discovered in time.

A STARVING TREE ON SCHOOL GROUNDS

The starving tree in the picture above soon died, but feeding in the manner shown below would have saved it, if food elements had been supplied at the right time.



FEEDING MAY BE ECONOMICALLY DONE WITH SPECIAL COMPRESSED AIR EQUIPMENT

Eliminating the Menace of Weak and Decayed Trees

Elms and some of the maples are often dangerous inhabitants of school grounds because many of them have weak V-shaped forks which are likely to split down, causing one side of the tree to come crashing to the ground. To eliminate the menace of such trees, they should be carefully inspected and properly strengthened and braced where this treatment is needed.

Trees with badly decayed trunks or branches should, of course, be inspected to make certain of their true condition. In some cases it will be found best to cut these trees down before a wind whirls them into valuable property or on the heads of passers-by. In many cases, decay-weakened trees can be protected by cutting out the diseased wood tissue, installing any bracing that is necessary, and then filling the cavity with a strong and durable sectional concrete filling. It is important to do this work before decay has time to make much headway and before it is expensive to overcome. Regular inspections are important in maintaining the life and beauty of trees economically.

Controlling Insect Pests

In some sections, insects are a very real menace to trees. Scale and various other sucking insects attack the leaves and branches. The leaf-eaters, which include Japanese beetles, canker worms, gypsy moths, and many others, may consume the foliage with astonishing speed. Repeated defoliation will cause trees to die. Any extensive defoliation destroys the beauty of the trees. Spraying, properly done by skilled men using efficient spray equipment, will completely control most of the insect pests.

Tree care should be placed on a yearly maintenance basis. That is the logical way to take care of trees, and the method that must be used if costs are to be kept at an absolute minimum. It all works out a good deal like the care of the body or of the teeth. By having an annual or semi-annual check-up, most troubles can be discovered and quickly corrected as they arise, and a small investment will correct them before they become serious. But if one waits too long, corrective care is difficult, more expensive, and perhaps entirely impossible.

What a tragedy it is to needlessly lose the companionship and inspiring beauty of fine old trees that could have been saved by friendly, timely care skilfully given.

A TREE WITH A SHARP, SPLITTING V-SHAPED FORK, FREED OF DECAY, BRACED, FILLED — AND SAVED BY TREE SURGERY

LANDSCAPE ARCHITECTS
FOR UNIVERSITY AND SCHOOL PROJECTS

The following directory is restricted to Landscape Architects who are in independent professional practice and have actually been identified with a number of university or school projects.

Space limitations permit only three listings for each individual or firm, and preclude mentioning either the name of the architect associated or the definite character of the work undertaken for each institution. It is believed that the majority of landscape architects specializing in school and university work are here represented, and that many of the projects listed have had a considerable influence on high-grade professional practice in the planning and planting of school grounds and college campuses throughout the United States.

CALIFORNIA

Wilbur D. Cook, 4025 W. 25th St., Los Angeles
(formerly Cook, Hall & Cornell)
Territorial School, Honolulu, Hawaii
Honolulu College, Honolulu, Hawaii
Pomona College, Claremont

Ralph D. Cornell, 3723 Wilshire Blvd., Los Angeles
(formerly with Cook, Hall & Cornell)
Pomona College, Claremont
Claremont Colleges, Claremont
University of Hawaii, Honolulu

Charles H. Diggs, Civic Center Bldg., Los Angeles
Georgetown University Preparatory School, Washington, D. C.
Mount Vernon Seminary, Washington, D. C.
University of Southern California, Los Angeles

Howard Gilkey, Box 292, Redwood City
Santa Rosa Junior College, Santa Rosa
St. Mary's College, Moraga
Modesto Junior College, Modesto

John William Gregg, University of California, Berkeley
Campus development for the University of California at Berkeley, Los Angeles, Riverside, Davis, La Jolla and U. C. Hospital, San Francisco

McKown and Kuehl, 9507 Santa Monica Blvd., Beverly Hills
Iowa State Teachers' College, Cedar Falls, Iowa
Public Schools, Davenport, Iowa
Huntington Beach Union High School, Huntington Beach

H. W. Shepherd, 821 Shattuck Ave., Berkeley
Union High School and Junior College, Marysville
Branch College of Agriculture, Davis
Round Valley Union High School, Covelo

COLORADO

S. R. DeBoer, 515 East Iliff Ave., Denver
University of Denver, Denver
Colorado Woman's College, Denver
The Idaho Technical Institute, Pocatello, Idaho

McCrary & Culley, 900 Exchange Bldg., Denver
University of Colorado, Denver
The College of the Ozarks, Clarksville, Ark.
New Mexico Military Institute, Roswell, N. Mex.

CONNECTICUT

Thomas H. Desmond & Associates, Inc., Simsbury
U. S. Coast Guard Academy, New London
Ethel Walker School, Simsbury
Westminster School, Simsbury

DISTRICT OF COLUMBIA

Rose Greely, 1707 I St., Washington
Madeira School, Greenway, Va.
Hillcrest-Washington City Orphanage
New York Military Academy, Cornwall-on-Hudson, N. Y.

FLORIDA

Frank M. Button, 913 Avenue Majorca, Coral Gables
University of Vermont, Burlington, Vt.
Ponce de Leon High School, Coral Gables
Millikin University, Decatur, Ill. (Partner of Simonds Co.)

Herbert L. Flint, Woolworth Bldg., Orlando
Mount Union College, Alliance, Ohio
Newport School, Ironwood, Mich.
Rollins College, Winter Park

ILLINOIS

Jacob L. Crane, Jr., Wrigley Bldg., Chicago
Lawrence College, Appleton, Wis.
High School, Ponca City, Okla.
Chicago Board of Education (64 schools)

Chance S. Hill, 1333 Maple Ave., Downers Grove
North Central College Campus, Naperville
Northern Illinois State Teachers College, DeKalb
Maine Township High School, Des Plaines

F. A. Cushing Smith & Associates, 175 W. Jackson Blvd., Chicago
High School Group, Shorewood, Milwaukee, Wis.
St. Joseph's Seminary, Hinsdale
St. Agnes School, Albany, N. Y.

INDIANA

Donald B. Johnston, 909 Architect's and Builder's Bldg., Indianapolis
Miami University, Oxford, Ohio
Earlham College, Richmond
City School Bldg., South Side, Richmond

Lawrence V. Sheridan, Brendonwood, Indianapolis
Purdue University, Lafayette
St. Mary of the Woods Academy, Terre Haute
Shortridge High School, Indianapolis

IOWA

Philip H. Elwood, Jr., Landscape Architecture Department, Iowa State College, Ames
Iowa State College, Ames
Iowa State Teachers College, Cedar Falls
Dorothy Love Presbyterian Home, Sidney, Ohio

MAINE

Beatrix Farrand, Reef Point, Bar Harbor
Yale University, New Haven, Conn.
Princeton University, Princeton, N. J.
University of Chicago, Chicago, Ill.

MARYLAND

Irving W. Payne, 4017 Leland St., Chevy Chase
Georgetown Preparatory School, Garrett Park
The Miss Madeira School for Girls, Greenway, Va.
Lanham Grade School, Lanham

MASSACHUSETTS

Robert Washburn Beal, 185 Devonshire St., Boston
Eldon Keith Field, High School, Brockton
Bowdoin College, Bowdoin Athletic Field, Brunswick, Maine
High School Campus and Athletic Field, Whitman

Harold Hill Blossom, 210 Mt. Vernon St., West Roxbury
Beaver Country Day School, Brookline
Amherst College, Amherst
Dedham High School, Dedham

Franklin Brett, Franklin St., Duxbury
Ware High School, Ware
Walpole High School, Walpole
(Brett & Hall, Landscape Architects)
Duxbury High School, Duxbury

Laurence S. Caldwell, 45 Bromfield St., Boston
Vassar College, Poughkeepsie, N. Y.
Bates College, Lewiston, Maine
Belmont High School, Belmont

Herbert J. Kellaway, 12 West St., Boston
Amherst College, Amherst
Hartford Theological Seminary, Hartford, Conn.
North Junior High School, Quincy

Warren H. Manning Offices, Inc., 210 Brattle Bldg., Harvard Square, Cambridge
Burbank School, Belmont, Mass.
University of Minnesota, Minneapolis
High School Grounds and Play Field, North Reading, Mass.

Hallam L. Movius, 91 Newbury St., Boston
University of Buffalo, Buffalo, N. Y.
Tilton Academy, Tilton, N. H.
Beaver Country Day School, Brookline

John Nolen, Harvard Square, Cambridge
Babson Institute, Wellesley
Queens College, Charlotte, N. C.
University of Wisconsin, Madison, Wis.

Olmsted Brothers, 99 Warren St., Brookline
Phillips Academy, Andover
Denison University, Granville, Ohio
Duke University, Durham, N. C.

Bremer Whidden Pond, 5 Boylston St., Cambridge
University of New Hampshire, Durham, N. H.
Southern Methodist University, Dallas, Texas
Radcliffe College, Cambridge

William H. Punchard, 11 Harding Ave., Belmont
Woburn High School Athletic Field, Woburn
Middlebury College, Middlebury, Vt.
Abbot Academy, Andover

Arthur A. Shurcliff, 11 Beacon St., Boston
Amherst College, Amherst
Wellesley College, Wellesley
Mount Holyoke College, South Hadley

Frank A. Waugh, Amherst
Massachusetts State College, Amherst
Kansas State Agricultural College, Manhattan, Kans.
New York State Experiment Station, Geneva, N. Y.

Joseph F. Whitney, Falmouth
Engineering Court, University of Cincinnati
School Group, Falmouth, Mass.
Grade and High School, South Dennis, Mass.

MICHIGAN

Carol H. Lawrence, 527 Copeman Blvd., Flint
Kalamazoo College, Kalamazoo
University of Rochester, Rochester, N. Y.*
University of Michigan, Ann Arbor *
* While with Pitkin & Mott, Cleveland, Ohio

T. Glenn Phillips, 1101 Charlevoix St., Detroit
Michigan State College, East Lansing
Sacred Heart Seminary, Detroit
University of Detroit, Detroit

Raymond Hill Wilcox, 1047 Whittier Blvd., Detroit
Duns Scotus College, Detroit
Starr Commonwealth for Boys, Albion
Grosse Point High School, Grosse Point

H. O. Whittemore, Department of Landscape Design, University of Michigan, Ann Arbor
Tappan Junior High School, Ann Arbor
Mack Junior High School, Ann Arbor
Hematite Township High School, Amasa

MINNESOTA

Hugh Vincent Feehan, 1004 Marquette Ave., Minneapolis
Mt. St. Mary-on-the-Fox, St. Charles, Ill.
College of St. Scholastica, Duluth
St. Thomas College, St. Paul

Morell & Nichols, Inc., 1200 Second Ave., South, Minneapolis
University of Minnesota, Minneapolis
Washington State College, Pullman
Carleton College, Northfield, Minn.

Charles H. Ramsdell, 839 Metropolitan Life Bldg., Minneapolis
Glencoe High School and Recreation Center, Glencoe
Rochester Schools, Rochester
Stout Institute, Athletic Field and Recreation Center, Menomonie, Wis.

MISSOURI

Hare & Hare, 114 West 10th St., Kansas City
University of Kansas, Lawrence
Fort Worth School System, Fort Worth, Texas
University of Texas, Austin

John Noyes, Railway Exchange Bldg., St. Louis
New Mary Institute, St. Louis County
Washington University, St. Louis
Westminster College, Fulton

NEW JERSEY

Russell Van Nest Black, 48 First National Bank Bldg., Princeton
Peddie School, Hightstown
Westminster Choir School, Princeton
Public Schools, Ithaca, N. Y.

Marjorie Sewell Cautley, Ridgewood
Fieldston School Campus, Riverdale, N. Y.
Tenafly High School Grounds, Tenafly
Roosevelt Common Athletic Field, Tenafly

NEW YORK

Briggs & Stelling, 10 East 40th St., New York
(also Charleston, S. C.)
Colonial School, Pelham
Memorial High School, Pelham
Prospect Hill School, Pelham Manor

A. F. Brinckerhoff, 101 Park Ave., New York
Connecticut College, New London
Bronxville School, Bronxville
Trinity College, Hartford, Conn.

Brinley & Holbrook, 156 Fifth Ave., New York
(also Morristown, N. J.)
Columbia High School, Maplewood, N. J.
New Jersey State Normal School, Jersey City
New Jersey State Teachers College, Trenton

Harold A. Caparn, 144 East 30th St., New York
Lebanon Valley College, Annville, Pa.
Union Free School, Dist. No. 6, Manhasset, L. I.
Brooklyn Botanic Garden, Brooklyn, N. Y.

Laurie D. Cox, 136 Kensington Place, Syracuse
Acadia University, Wolfville, Nova Scotia
Hudson High School Athletic Field, Hudson
Mamaroneck High School, Mamaroneck

Alling S. DeForest, 16 Fair Place, Rochester
High School and North Street School, Geneva
Villa Chantill, Rock Island, Ill.
Colgate-Rochester Divinity School, Rochester

Byrant Fleming, 118 Dryden Road, Ithaca
(also Wyoming, N. Y.)
Cornell University, Ithaca
Ithaca Heights School, Ithaca
Toronto University, Toronto, Canada

Francis Hastings Gott, 311 Alexander St., Rochester
Nazareth Convent and Academy, Pittsford
Central School, District No. 1, Brockport
Charlotte High School, Charlotte

Harries & Reeves, 110 Franklin St., Buffalo
Athletic Field, Lockport
Athletic Field, Wilson
Canajoharie Tennis Courts, Canajoharie

Frederic C. Hoth and Paul B. Schumm, 5 Columbus Circle, New York
St. Cecelia High School, Englewood, N. J.
Leonia Grammar School, Englewood, N. J.
St. Vincent de Paul Parochial School, Bayonne, N. J.

Charles Downing Lay, 101 Park Ave., New York
New York State Normal Training School, Cortland
Newburgh Free Academy, Newburgh
Waterbury High School, Waterbury, Conn.

H. B. Littlefield, 1 Oak St., North White Plains
Central High School, Hancock
High School of White Plains, and Stadium, White Plains
Battle Hill School, White Plains

Charles N. Lowrie, 101 Park Ave., New York
Lawrenceville School, Lawrenceville, N. J.
State School for the Deaf, Trenton, N. J.
Oyster Bay Junior High School, Oyster Bay

Richard Schermerhorn, Jr., 342 Madison Ave., New York
Union College, Schenectady
St. Anthony's Seraphic Seminary, Catskill
Albany Academy, Albany

Vitale & Geiffert—Gilmour D. Clark, 101 Park Ave., New York
University of Illinois, Urbana
Pleasantville High School, Pleasantville
Virginia Military Institute, Lexington, Va.

Jacob John Spoon, Inc., 156 Grand St., White Plains
Academy of St. Joseph-in-the-Pines, Brentwood
Penn. Township School Dist. High School Grounds, Bernville, Pa.
Central School District No. 1, Pine Plains

NORTH CAROLINA

E. S. Draper Associates, 1522 East 4th St., Charlotte
Winthrop College, State College for Women, Rock Hill, S. C.
Davidson College, Davidson
Agnes Scott College, Decatur, Ga.

OHIO

William Pitkin, Jr. & Seward H. Mott, Inc., 3866 Carnegie Ave., Cleveland
University of Michigan, Ann Arbor, Mich.
University of Rochester, Rochester, N. Y.
Administration Bldg., Board of Education, Cleveland

A. D. Taylor, 4614 Prospect Ave., Cleveland
Carnegie Institute of Technology, Pittsburgh, Pa.
Oregon Agricultural College, Corvallis, Ore.
Mount Union College, Alliance

B. Ashburton Tripp, 821 Guarantee Title Bldg., Cleveland
High School, Parkersburg, W. Va.
High School, Shaker Heights
High School, Cleveland Heights

PENNSYLVANIA

Thomas W. Sears, Girard Trust Bldg., Philadelphia
Johns Hopkins University, Baltimore, Md.
Pennsylvania State College, State College
Bryn Mawr College, Bryn Mawr

Wheelwright & Stevenson, 225 South 15th St., Philadelphia
The Gunnery School, Washington, Conn.
St. Andrews School, Middletown, Del.
Muhlenberg College, Allentown

VIRGINIA

A. A. Farnham, 1240 White Oak Road, Roanoke
Hollins College, Hollins, Va.
Sweet Briar College, Sweet Briar, Va.
Virginia Polytechnic Institute, Blacksburg, Va.

Charles F. Gillette, 105 East Cary St., Richmond
Jesuit Novitiate, Wernersville, Pa.
LaSalle Peru High School, LaSalle, Ill.
State Normal School, Richmond

WASHINGTON

Butler S. Sturtevant, New World Life Bldg., Seattle
(also 402 Jackson St., San Francisco, Calif.)
Principia College, Elsah, Ill.
Principia School, St. Louis, Mo.
University of Washington, Seattle

WISCONSIN

Phelps Wyman, 759 N. Milwaukee St., Milwaukee
Senior High School, Neenah
State School of Mines, Rapid City, S. Dak.
Lincoln High School, Wisconsin Rapids

WYOMING

Harold L. Curtiss, University of Wyoming, Laramie
John Muir Junior College, Pasadena, Calif.
Park County Union High School, Cody
Fraternity Park, University of Wyoming, Laramie

CANADA

Arthur M. Kruse, 59 High Park Blvd., Toronto, Ontario
The Boys' Training School, Bowmanville, Ontario
Woodstock College, Woodstock, Ontario
Belleville Institution for the Deaf, Belleville, Ontario

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Complete Line of Fences and Playground Equipment

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Anchor Chain Link Fences

Makers of America's first chain link fence, the Anchor Post Fence Company today manufactures a complete line, and will be glad to supply any interested school executive or architect with a copy of our Chain Link Fence Catalog containing full information about the four exclusive features which make an Anchor Chain Link Fence exceptionally attractive and durable. **Ask for Catalog No. 89.**

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Through the exclusive Anchor-Weld method of construction, the Anchor Post Fence Company is able to manufacture iron fences and gates which equal in appearance many expensive hand-wrought products. Many schools throughout the country are today justly proud of their beautiful Anchor-Weld Ornamental Iron Fences and Gates. Some of these are to be found illustrated in our **Catalog No. 83.**

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Drive-Anchorage

Anchor's Four Exclusive Features

1. **ANCHOR-WELD WIRE GATE**—built with a frame of square tubular steel—arc-welded at the corners. The square shape of the heavy steel tubing, together with the welding of the corners, provides a framework of such exceptional strength that no reenforcing diagonal braces are needed. We claim that this is the strongest and most attractive wire gate made.

2. **SQUARE TERMINAL POSTS**—stronger because they are square in section. More protective—having no fabric-holding bands and therefore providing no footholds for climbing. Better-looking—because of their graceful lines.

3. **U-BAR LINE POSTS**—made of high carbon steel and U-shaped in section to insure maximum strength.

4. **DRIVE-ANCHORAGE**—grips the soil like the roots of a tree. We have imitated nature's engineering by providing the line posts with a broad foundation. Anchor drive-anchors defy thaws, frosts and the many other strains to which a fence is subjected.

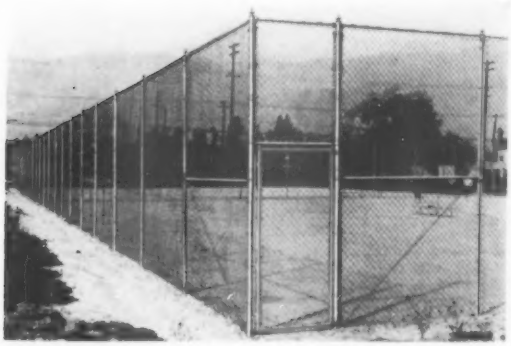
Note: While we strongly advocate the drive-anchor method of setting posts, we can, if desired, set our posts in concrete footings when conditions warrant such a procedure.

Anchor-Weld
Wire Gate

Anchor Chain Link Fence with Top Rail
Public School, Pittsburgh, Pa.

Anchor
U-Bar
Line Post

Anchor Square
Terminal
Post



Anchor Chain Link Tennis Court Enclosure at Pasadena High School, Pasadena, Calif.

Anchor-Weld Fence Surrounding the Hartford High School, Hartford, Conn.

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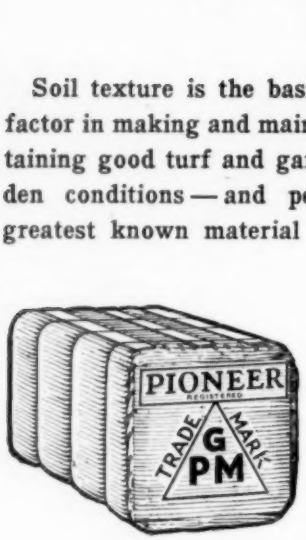
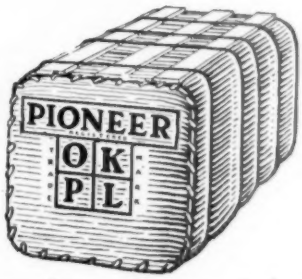
A TYPE OR QUALITY FOR EVERY GARDEN NEED

Soil texture is the basic factor in making and maintaining good turf and garden conditions — and peat moss is the greatest known material for creating the correct soil condition. It lightens clay; gives body to sand; supplies necessary humus to all. We have a type of peat moss for every need.



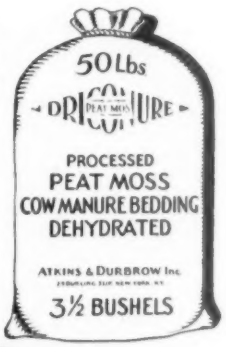
G P M — Granulated Peat Moss — granulated to the consistency best suited to garden use — for incorporating into soil and for either Summer or Winter mulching.



OKPL — A coarser grinding than G P M but sometimes preferred and frequently used instead of G P M, because it does not disintegrate so fast. Also used for poultry litter.

SORBEX — 20 times **finer** than G P M. Used mostly as a top dressing for lawns and putting greens where humus must be introduced without digging up the seed bed. Also used extensively for seed beds, flats and for incorporating with soil where quicker disintegration is desired.

DRICONURE— Peat Moss which has absorbed cow manure — both solids and liquids; making a complete organic fertilizer of great merit. Free of weed seeds; will not burn under any conditions.



JUSTRITE—A less expensive line including garden peat, poultry litter and stable bedding. The same general type of peat moss but not so perfectly and consistently uniform in quality or structure.

A&D
STABLE BEDDING
PEAT MOSS

A&D Stable Bedding — The coarsest grinding of peat—admirably suited to its purpose. Keeps stables clean, free from odor. A germicidal tendency retards development of flies, maggots and other insects.

Free Literature gladly supplied on any or all of the above

CINCINNATI IRON FENCE COMPANY, INC.

Manufacturers and Erectors of Plain and Ornamental Iron and Wire Work

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PRODUCTS

IRON and **WIRE FENCE** for **PARKS** and **PLAYGROUNDS, SCHOOL YARDS, TENNIS COURTS** and **ATHLETIC FIELDS.**

Entrance Gates to match fence.
Folding Gates.
Iron and Wire Window Guards.
Steel Settees, also Wood Slat Settees.

Iron Fence—"Cincinnati Fence" embraces a complete line of designs with pointed, malleable or bowed picket tops suitable for residences; single and double bowed tops for schools; and non-climbable tops for institutions; made of the best open hearth steel or common wrought iron, refined iron or genuine puddled iron.

Wire Fence—Copper bearing chain link fence, with selvages barbed or knuckled, with or without extension arms with three or five-strand barbed wire.

Gates—Swinging, sliding or folding, for entrances of every description.

Window Guards—Designs suitable for buildings of all types, made of WIRE or IRON.

Blue prints and illustrations of our many and varying standard designs will be gladly furnished upon request.

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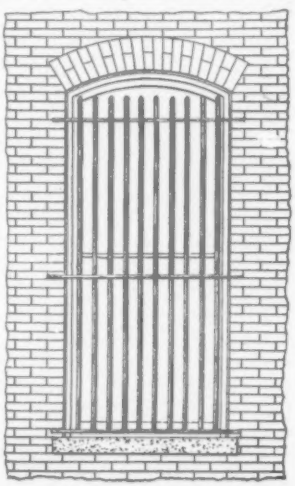
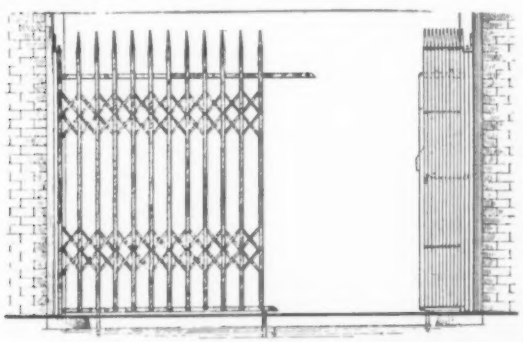
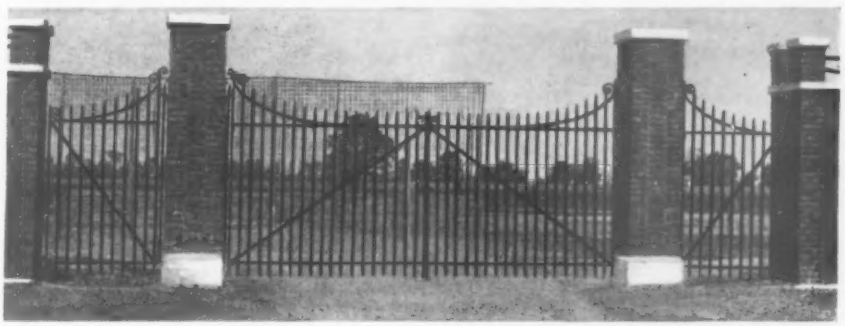
As nearly every project presents some special problem of design, our staff offers helpful design-engineering to school architects. The execution of your special designs will be reliably handled in our shop by thoroughly trained and experienced craftsmen. Our service, while exceptionally satisfactory on rush jobs, is never without the accuracy, sturdy construction and rugged strength that will endure the test of time. We welcome the opportunity of furnishing estimates.



At Left — Bostwick Lattice Type Folding Gate. (Can Also Furnish the All-Lattice Type)

At Right — Iron Window Guard-Pickets ½ or ⅝ Inch Round





At Right — Entrance to the Athletic Field of the Ohio Northern University, Ada, Ohio. Write for Illustrations, Giving Measurements of Your Enclosure for Your Particular Requirements

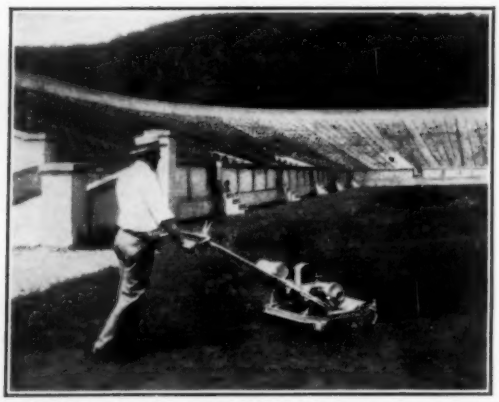
COLDWELL LAWN MOWER COMPANY

Manufacturers of

Hand, Horse, Motor and Electric Lawn Mowers

Sales and Service

Newburgh, N. Y.



ROLLING AND MOWING ON STADIUM AT UNITED STATES MILITARY ACADEMY, WEST POINT, NEW YORK

SUPER-TWIN WITH GANG ATTACHMENT, CUTTING 60-INCH SWATH ON GROUNDS OF MT. SAINT MARY'S ACADEMY

COLDWELL LAWN MOWERS are especially well adapted for the care of lawns and athletic fields. "Coldwell built" throughout, these motor mowers have many noteworthy features. The two-section drive roller with differential between prevents marking the lawns and makes turning easy. This full width drive roller also allows for a successive light rolling which helps to control lawn pests, conserves moisture and produces a smooth velvety surface. They are designed to trim close along walks, flower beds, trees and shrubbery. The abundance of power and corrugated drive roller makes them unexcelled for hilly lawns. Economical to operate and backed by the Coldwell guarantee of quality of manufacture. Built in both single and twin cylinder motors with a cutting capacity from 21 to 94 inches.

The Coldwell "Super-Twin"—30 inch, Motor Lawn Mower with Riding Sulky, combines rolling and mowing in one operation. Separate rolling made possible by our dual control. Revolving knife is engine driven and assures an even cutting surface. Three travel speeds that are easily adjusted. Abundance of power derived from a Super-Twin, four-cycle, water-cooled motor, mounted on a sturdy chassis of steel construction. Gang units may be attached to increase the cutting capacity. Essential to the maintenance of well kept athletic fields where competitive sports demand a playing area that facilitates action.

OTHER COLDWELL EQUIPMENT:

SINGLE CYLINDER; "Cub"—21 inch, "L-Junior"—25 inch, "Junior Thirty"—30 inch.

TWIN CYLINDER; "Super-Twin"—25 inch, 30 inch, 60 inch, 65 inch and 94 inch.

GANG LAWN MOWER for Tractor; 58 and 96 inch widths.

HORSE "ALL-STEEL" LAWN MOWER—35 inch.

ELECTRIC LAWN MOWER; 18 and 21 inch widths.

ELECTRIC TRIMMER for shrubs, hedges and grass.

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RIDING SULKY AND GRASS CATCHERS optional.

Our engineers will be glad to advise you on your particular mowing problems.

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THE AMERICAN SCHOOL AND UNIVERSITY

DEPENDABLE LAWN MOWERS

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THE COLUMBIA ALKALI CORPORATION

Manufacturers of

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Carew Tower, Cincinnati
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COLUMBIA CALCIUM CHLORIDE for eliminating dust on playgrounds, tennis courts, private driveways. For thawing ice in frozen drains, sidewalks and drives. For concrete curing and for refrigeration brines.

DUST-LAYING — Hundreds of miles of dirt and gravel roads are made dustless each year by treating them with Columbia Flake Calcium Chloride. Highway engineers have found this treatment so economical and efficient that this procedure has become standard practice wherever the dust nuisance prevails.

The same results are secured when Columbia Calcium Chloride is spread on playgrounds and private drives. Road or ground surfaces are made hard, compact, dustless and weedless. There is no odor or nothing to track or stain.

The same general results are secured when used on tennis courts but with the added advantage that the playing surfaces are darkened enough by the treatment to diminish their glare.

Complete literature on the uses and application of Columbia Calcium Chloride will gladly be sent on request.

Columbia Calcium Chloride comes in 100 lb. moisture proof bags and 400 lb. drums. Stocks are carried in all principal cities

GRAVELY MOTOR PLOW & CULTIVATOR CO.

Box 414, DUNBAR, W. VA.

GRAVELY SICKLE MOWER

A New Type Mower That Improves the Appearance of Your Property While Reducing Mowing Cost

Use the Gravely Sickle Mower for the rough spots . . . vacant lots full of cans and wire . . . along sidewalks and steep banks.

Use it in places where you can't take any other type mower and have had to cut with scythes in the past.

The sturdy GRAVELY with its patented SWIVEL ACTION Sickle type Bar, and single wheel traction will go anywhere . . . Cuts the weeds or grass regardless of height.

Let us tell you more about this new type machine . . . How it will reduce your mowing costs and improve appearances at the same time.

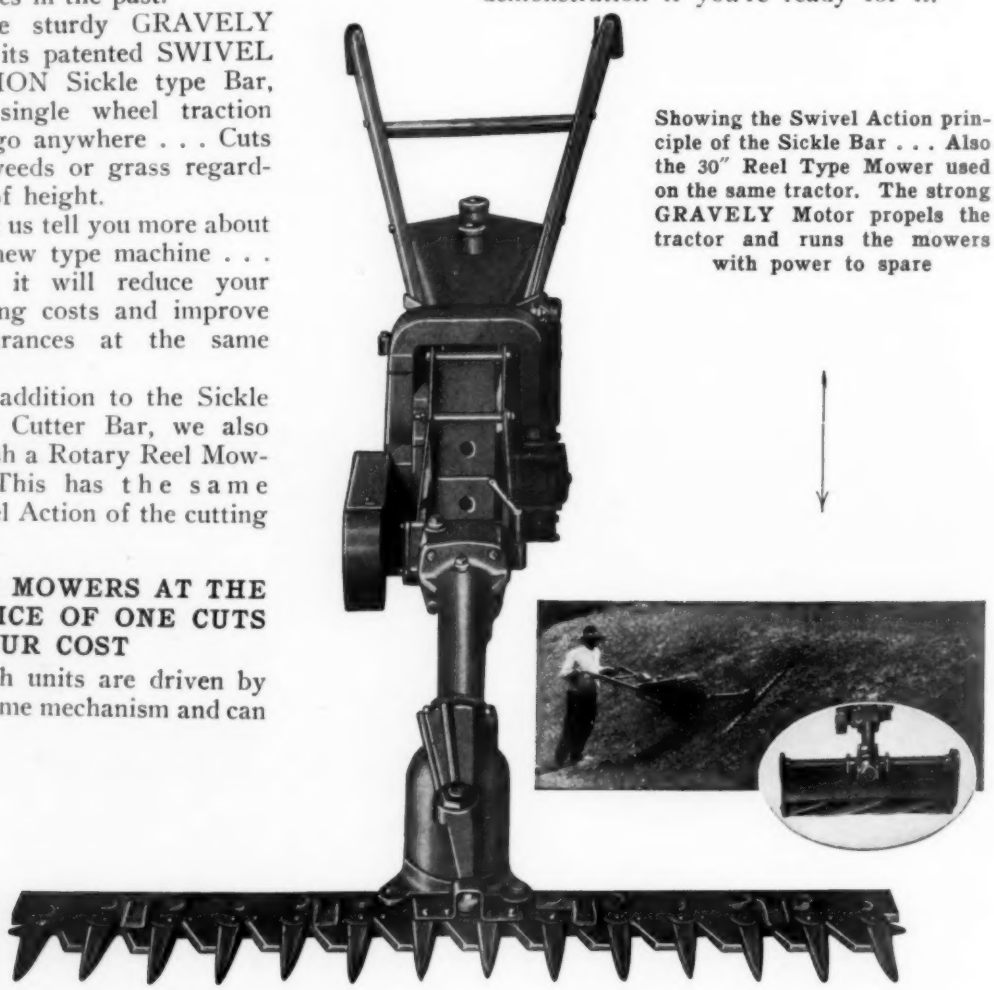
In addition to the Sickle Type Cutter Bar, we also furnish a Rotary Reel Mower. This has the same Swivel Action of the cutting bar.

TWO MOWERS AT THE PRICE OF ONE CUTS YOUR COST

Both units are driven by the same mechanism and can be changed in a few minutes by removing four bolts.

A DEMONSTRATION COSTS NOTHING

Write us for further information, or a demonstration if you're ready for it.



Showing the Swivel Action principle of the Sickle Bar . . . Also the 30″ Reel Type Mower used on the same tractor. The strong GRAVELY Motor propels the tractor and runs the mowers with power to spare

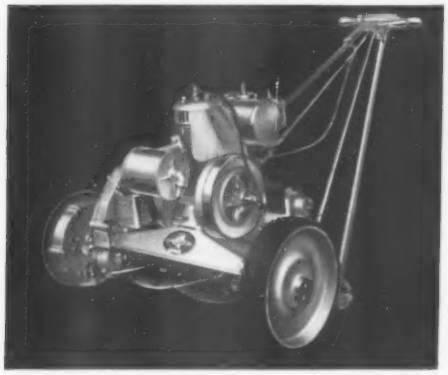
JACOBSEN MANUFACTURING COMPANY

740 Washington Avenue, Racine, Wisconsin

Power Lawn Mowers for Every Purpose

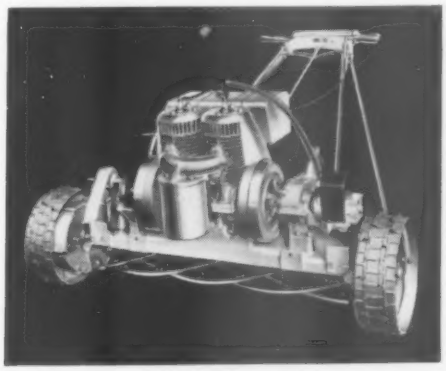
To provide economy in caring for lawns of every character, Jacobsen Power Lawn Mowers are built in both wheel and roller types, with cutting widths ranging from 20 inches to 66 inches and priced from $125.00 up. Each model is designed for a specific type of service by America's foremost power mower engineers.

Jacobsen Power Mowers are now used by schools and universities in all parts of the world for cutting every kind of grass. No matter what type or size lawn you have to cut, you can select a "Jacobsen" that will fit your requirements with the assurance that no other power mower offers such fine engineering, sturdy construction, efficient performance and economical operation.



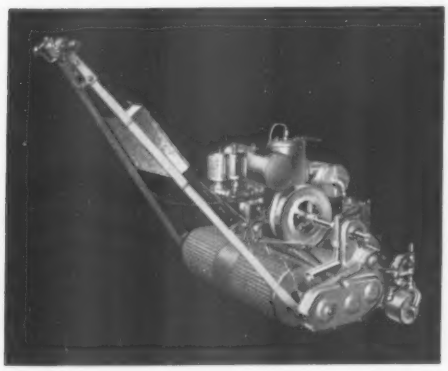
"4-ACRE"

Because of its extreme simplicity, rugged design and low cost of operation, the new Jacobsen heavy duty "4-Acre" is the choice of leading schools and institutions. Slow speed, single cylinder motor of 1½ H.P. Operating speed 900 r.p.m. at 3 miles per hour. Cutting width 24 inches. Capacity 4 to 6 acres per day. Furnished with rubber tired or steel wheels.



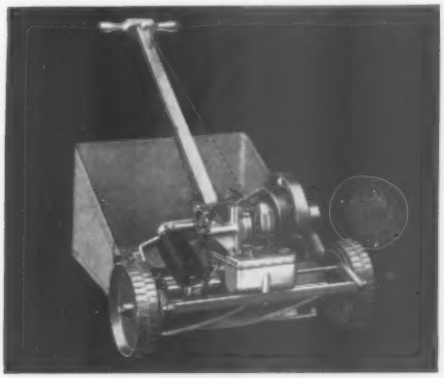
"TWIN"

The new Jacobsen "Twin" provides big acreage mowing with low labor and operating cost. It has a 32-inch cutting width to which can be added two 19-inch units giving a capacity up to 20 acres a day. Slow speed twin-cylinder motor, with two speed transmission, develops 3½ H.P. Operating speed 1,000 r.p.m. Ample power to operate gang attachment and riding sulky.



"ESTATE"

For real fine lawns that require frequent, but gentle rolling, the Jacobsen roller-driven "Estate" stands supreme. The large traction roller protects the delicate turf, massaging it with each cutting. The differential is located between the sections of the rear roller. Equipped with powerful, single cylinder motor. Made in 20-, 24- and 30-inch cutting widths.



"SIMPLEX"

The "Simplex" is light in weight and exceedingly easy to handle. For lawns as small as ¼ acre or on those thickly planted with trees and shrubs, it has proved a big time and labor saver. Single cylinder motor of ¾ H.P at 1,750 r.p.m. Cutting width 20 inches. Will mow 2 or 3 acres a day. The "Simplex" is practical for homes, small parks, and schools.

SEND FOR DESCRIPTIVE CATALOG OF JACOBSEN POWER MOWERS

THE MOTO-MOWER COMPANY

MAIN OFFICE
4600 Woodward Avenue
DETROIT, MICHIGAN

ANNOUNCING MOTO-MOWER'S GREATEST ACHIEVEMENT— THE SUPER-DETROIT

The SUPER-DETROIT model MOTO-MOWER challenges performance comparison with any grass cutter regardless of size or cost. Its motor, used exclusively on the SUPER-DETROIT, develops over two horsepower. Its sturdy, well-balanced construction promises years of efficient, trouble-free grass cutting under all conditions with lowest maintenance expense. Because the SUPER-DETROIT can cut 4 to 6 acres of lawn on two gallons of gasoline every day, it is highly recommended for park and public building grounds work.

30" CUT

A TWIST OF THE WRIST GUIDES IT

The famous "twist of the wrist" guiding principle which makes MOTO-MOWERS so easy to steer is a SUPER-DETROIT feature. This remarkable machine also possesses Selective Automatic Speed Control, which enables it to retain the same cutting speed no matter how smooth or rough the going. Its universal joint takes all the strain off the motor bearings, insuring better performance and longer life. The SUPER-DETROIT is a de luxe machine in every way, and unquestionably the best power lawn mower buy on the market.

The SUPER-DETROIT can be equipped with 2—20" trailer cutting units, enabling a 66" cut; 12 acres daily capacity.

Our STANDARD MODEL 24" is of the same sturdy construction as the SUPER—in fact, other than the width, the cutting unit is practically a duplicate of the SUPER-DETROIT MOWER. The motor, while somewhat smaller, is of ample power. Cuts four acres per day.

The CITY MODEL 21" is recommended for lawns of two to three acres.

Our JUNIOR MODEL 19" is the best low-priced machine built.

Specifications of the SUPER-DETROIT Model MOTO-MOWER

Width of cut, 30"; cutting adjustment, ½" to 2"; cutting speed, ½ to 3½ m.p.h.; cutting capacity, 4 to 6 acres per day; climbs 35% grade; gasoline consumption per day, about 2 gal.; weight (net), 340 lbs. (crated for shipment), 440 lbs.; color, gray enamel. **Motor**—four-cycle, valve-in-head, air-cooled; bore, 2¾"; stroke, 3¼"; 2-horsepower; speed, 1800 to 2400 r.p.m.; parts to lubricate, 1 place; control, automatic governor for speed control; ignition, magneto; carburetor, Tillotson. **Mower**—7" reel, with 5 crucible steel blades (tempered); bottom blade, flexible (tempered); clutches, dry disc-type; control, wheels can be engaged either together or separately; reel bearings, Shafer, self-aligning; handle, tubular steel; side frames, malleable iron; roller chains; drive wheels, 14". Pneumatic tired sulky available.

There's a Moto-Mower Dealer Near You

Moto-Mower TRADE MARK

Write for Our Complete Catalog of Moto-Mowers

OUTBOARD MOTORS CORPORATION

4143 North Twenty-Seventh Street
Milwaukee, Wisconsin

LAWN BOY Power Mower

Built by the Makers of EVINRUDE and ELTO Outboard Motors

Only $110

Subject to Change Without Notice

THIS "ONE-HAND" MOWER TRIMS 6 INCHES CLOSER

With its farther-forward cutting bar, Lawn-Boy trims 6″ closer than a hand mower—does a complete, beautiful job around trees, shrubs, flower beds and hedges.

It climbs or mows lenghtwise of steep terraces without slipping or sliding and without short cutting the troughs and sod-chewing the crests.

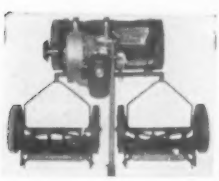
Only 25″ wide for the narrow spaces; full 18″ cut with four cutting heights. Runs all day on a gallon of fuel. Weighs only 95 pounds—won't pack the soil. Third successful season. Hundreds of enthusiastic users include parks, estates, cemeteries, schools and golf clubs.

ONE-HAND ALL METAL GRASS CATCHER

Here is the right idea in grass catchers—one that pours its load out the back so cuttings cannot get into the mower and clog up the reel. With grass in a dry, loose condition, cuttings drop easily into windrows as you walk along—without stooping, without detaching the catcher $8.50

38″ CUT WITH GANG ATTACHMENT

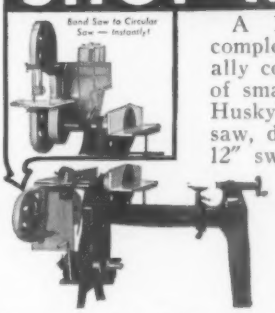
On flat areas, with normal stands of grass, Lawn-Boy will handle a two-gang attachment which increases the cut to 38 inches. Our tandem mowers can be purchased later and attached at any time, for every Lawn-Boy is built with hitching slots to make the hook-up. Purchased with Lawn-Boy, $40.00. Separately, $50.00.



A TYPICAL LETTER:

"We are eminently pleased with the two Lawn-Boy mowers. These machines are noiseless, simple to handle, light in weight, and economical in their operation. H. L. BOURGEOIS, Parish Supt., Terrebonne Parish School Board, Houma, La."

SHOP-KING



A RUGGED, man-size, complete machine that actually costs less than an outfit of small, light machines. Husky, band saw, circular saw, disc jointer, lathe with 12″ swing. One motor with 6-speed, quick-shift belt does all jobs.

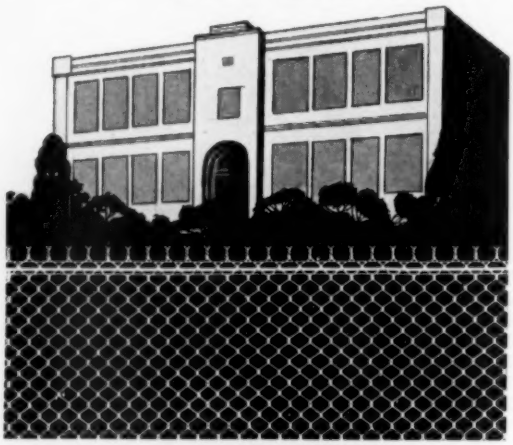
We also build a complete line of centrifugal portable pumps—both low and high pressure types—for general and fire protection purposes. Send for special literature.

PITTSBURGH STEEL CO.

Union Trust Building, Pittsburgh, Pa.

New York Chicago San Francisco Philadelphia Los Angeles
Dallas Syracuse Detroit Memphis St. Louis Atlanta

PITTSBURGH
CHAIN LINK FENCE . .



. . . *for* SCHOOLS
***and* PLAYGROUNDS**

Pittsburgh Chain Link is the ideal type of fence for school yard enclosures, playgrounds, athletic fields, swimming pools, tennis courts and for such other installations as require a maximum of strength and long life combined with a maximum of good looks and a full measure of true economy. Point by point, the main features which go to make Pittsburgh Chain Link Fence outstanding in its field are:

1. **THE FABRIC**—which is full-gauge, copper-bearing, open-hearth steel wire, heavily hot zinc coated after weaving. This fabric is available in many weights and mesh-sizes to meet all varieties of service needs.

2. **THE FRAMEWORK**—which combines solid H-Section line posts with copper-bearing seamless steel pipe terminal posts, top rail and gate frames.

3. **THE FITTINGS**—in the design of which have been incorporated every possible feature to make for strength, convenience and ease of application and use. Fence fittings are no mean index of the value of a finished fence job. Expense spared here, although perhaps permitting some play in price, seldom fails to make itself known after a few years of usage. Pittsburgh fittings are all highest quality pressed steel and malleable iron for long service.

4. **THE SERVICE**—which Pittsburgh Steel Company is ready to furnish. If you want complete erection service, we'll provide expert erection men to do your entire job for you. If you prefer to erect your own fence with your own labor, we'll work with you to whatever extent you may need us. Our Engineering Department is set up to act in an advisory as well as a planning capacity.

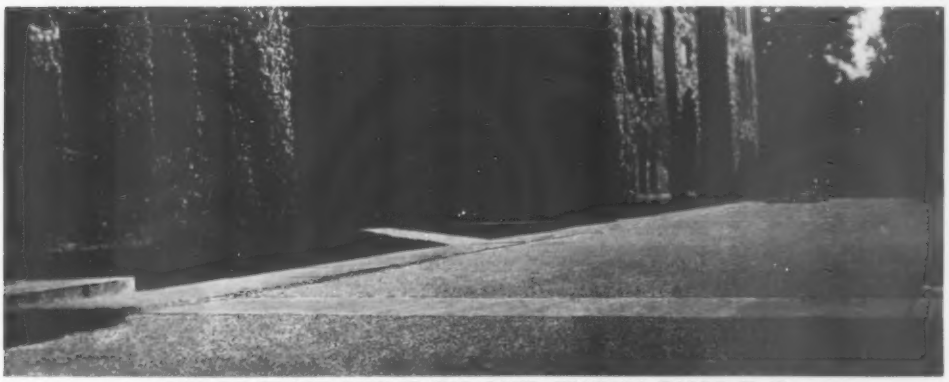
Pittsburgh Chain Link Fence is the product of over 30 years of steel and fence manufacturing experience. This Company has always made quality products—and quality products only—under continuous rigid inspection from the ore to the finished materials. You may feel safe in accepting our guarantee of complete satisfaction with any Pittsburgh Product.

Pittsburgh Steel Company also manufactures Ornamental Lawn Fences; Estate, Residential and Industrial Fences; Farm and Poultry Fences; Annealed Wire; Barbed Wire; Galvanized Wire; Spring Wire; Nails; Staples; Welded Wire Reinforcing for Streets, Sidewalks, Highways and General Construction; Pittsburgh Steeltex (wire reinforcing mesh with integral fibrous backing) in styles for Brick, Stucco or Plaster. Please write for further information.

STANDARD OIL OF NEW YORK

DIVISION OF SOCONY-VACUUM OIL COMPANY, INCORPORATED

26 Broadway, New York, N. Y.



THE DE VEAUX SCHOOL FOR BOYS, NIAGARA FALLS, N. Y.
Road Construction with Socony Asphalt Products

Socony Asphalt Binders "B" and "C"

Socony Cold Patch Asphalt

STANDARD

ASPHALTS
(Socony Brand)

Socony Liquid Asphalt

Socony Asphalt Paving Fillers

Asphalt Macadam Roads

Asphalt Macadam Roads built by the Penetration Method are recognized by leading engineers as one of the most durable types of construction, being economical in cost and maintenance. This type presents a non-skid, all-weather surface, ideal for school and university grounds.

Socony Asphalt Binders "B" and "C" are widely used for such construction, in amounts varying from 2 to 3 gallons per square yard, being applied at temperatures ranging from 275 degrees to 350 degrees.

For Surface Treating of Gravel Roads and Paths

For economical treatment of dirt and gravel roads and paths, where it is desired to lay the dust and protect the surface with an Asphaltic mat, Socony Liquid Asphalts are produced in different grades to meet particular requirements. Socony Liquid Asphalts are usually applied in amounts varying from ¼ to ½-gallon per square yard and require a cover of sharp sand or clean gravel.

For Repairing Road and Path Surfaces

Socony Cold Patch Asphalt is an ideal patching material for repairing holes, ruts and depressions in all types of bituminous road surfaces. It is equally effective for restoring worn, uneven surfaces of brick and wood block pavements.

For each cubic yard of ½-inch to ¾-inch dry stone, we recommend the use of about 16 gallons of Socony Cold Patch Asphalt. Socony Cold Patch Asphalt is used without heating and is workable the year round.

For Filling Joints of Brick and Concrete Pavements

Standard Asphalt Paving Fillers (Socony Brand) for filling joints of brick, granite, and concrete pavements are especially refined Asphalts of high melting point. We also supply Asphalt Fillers containing mineral matter. Either of these grades is poured or squeezed to produce a rigid pavement.

THE STEWART IRON WORKS COMPANY

Incorporated

Iron Fence, Chain Link Wire Fence
Baseball and Tennis Backstops

222 Stewart Block, Cincinnati, Ohio

Stewart FENCES

STEWART SCHOOL FENCES

We offer a complete line of Iron and Chainlink Fences and are capable of fulfilling any school fence requirement, whether it be for frontage, rear line, tennis court, or athletic field.

SALES AND ERECTION SERVICE

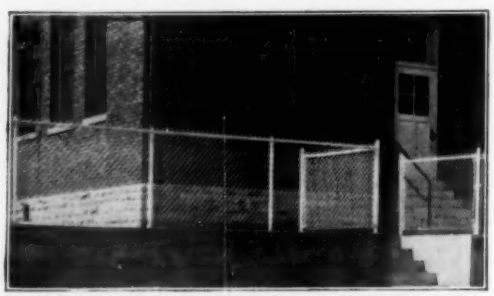
Stewart factory distributors in all principal cities, together with our competent erection crews throughout the country, give our customers a service both convenient and economical. Each installation is under our supervision—consequently the responsibility is undivided.

FACTORY FACILITIES

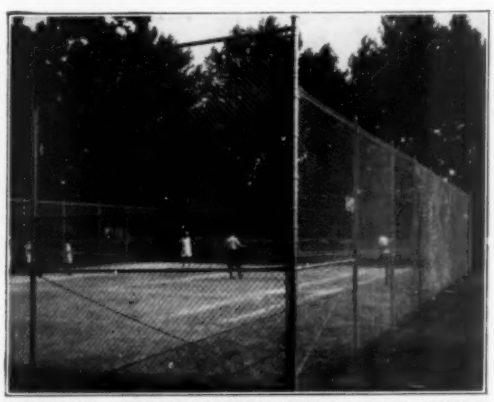
Stewart has unsurpassed facilities for the manufacture of fencing or any of the products listed below. Factory contains 350,000 sq. ft. of floor space, modern machinery; skilled workmen and draftsmen.

OTHER STEWART PRODUCTS

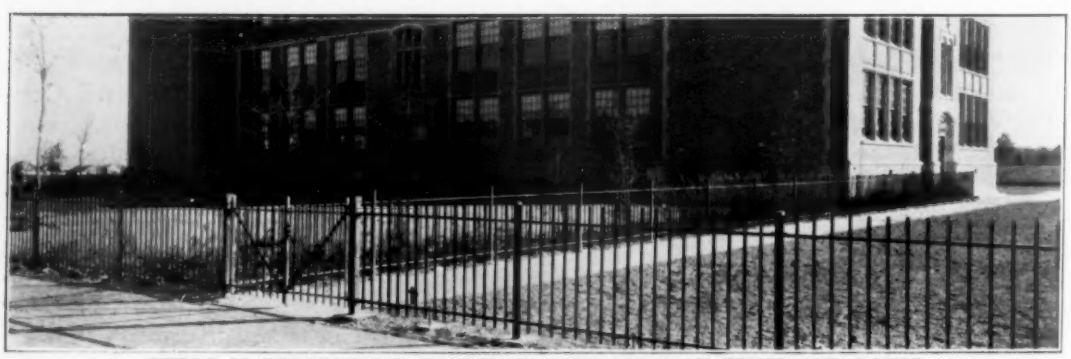
Bracket Lanterns
Gates (Iron and Wire)
Settees (Iron and Wire)
Railing
Window Guards
Wire Partition Work



STEWART CHAIN LINK FENCE STYLE OTM. AVAILABLE IN 4'-5'-6' HEIGHTS



STEWART TENNIS COURT ENCLOSURE STYLE "PROFESSIONAL." AVAILABLE IN 8'-10' AND 12' HEIGHTS



THERE IS SUBSTANTIAL BEAUTY IN STEWART IRON FENCE AND GATES FOR SCHOOL FRONTAGE

THE TEXAS COMPANY

ASPHALT SALES DEPARTMENT

135 East 42nd Street, New York City

New York
Philadelphia
Richmond
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Boston

Jacksonville
Chicago
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Houston

TEXACO
ASPHALTIC PRODUCTS

CONSTRUCTING A LOW COST SURFACE USING MINIMUM EQUIPMENT ON SCHOOL PLAYGROUND IN LEBANON, PA.

THIS DURABLE TEXACO ASPHALT DRIVE AT WASHBURN COLLEGE, TOPEKA, KANSAS, WILL SERVE FOR MANY YEARS WITH MINIMUM MAINTENANCE

for surfacing and repairing driveways, playgrounds, walks, etc.

As the fruits of a quarter century of Asphalt refining experience, we offer a complete assortment of Texaco Asphaltic products.

Whether you wish to design an entirely new surface for driveways, playgrounds, etc., superimpose an inexpensive, protective covering on an existing surface, merely to lay the dust for a season, or patch a few holes, there is a Texaco Asphaltic product intended for that purpose.

It is possible with a minimum of equipment, ordinary labor and at attractively low cost to secure a smooth, dustless, and waterproof Texaco Asphaltic surface for drives or playgrounds, which will give excellent service for some years.

Why not have a man who has had many years experience suggest ways and means of solving your driveway or playground surfacing problems? Ask a Texaco engineer to call.

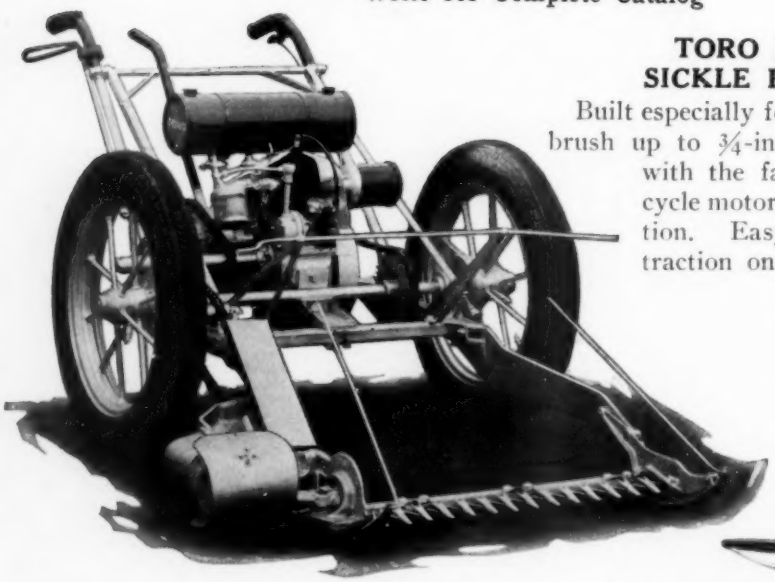
TORO MANUFACTURING CO.

America's Largest Builders of Power Grass-Cutting Machinery

3042–3206 Snelling Ave., Minneapolis, Minn.

TRACTORS — POWER LAWN MOWERS — ROLLERS

Write for Complete Catalog



TORO PARKWAY SICKLE BAR MOWER

Built especially for cutting weeds, hay or brush up to ¾-inch diameter. Powered with the famous Toro 2 H.P., 4-cycle motor. Heavy duty construction. Easy operation. Positive traction on rough ground and up steep grades assured by large diameter pneumatic-tired wheels.

THE TORO PARK SPECIAL

Amazingly efficient small power mower . . . flexible, easy handling, large capacity, low operating and upkeep costs, long life. Makes 30-inch cut, mows 4 to 6 acres a day. Climbs grades without damage to turf. Clean cutting. Powered with the Toro 2 H.P., 4-cycle, air-cooled motor.

TORO IMPROVED POWER ROLLER

Eliminates tedious hand rolling for tennis courts and athletic fields. Rolling width 30 inches. Weighs (with operator) about 1250 lbs. Speed up to 3½ M.P.H. Forward and reverse gear obviates constant turning. Gang roller attachment available, giving 84-inch rolling width. Toro standard 4-cycle, air-cooled motor . . . 2 H.P. for single unit, 2¼ H.P. with gang roller.

WORTHINGTON MOWER COMPANY

Main Office and Factory
Stroudsburg, Pa.

SALES AGENCIES IN ALL PRINCIPAL CITIES

Machinery of Specialized Design to Meet Every Mowing Requirement

FOR SCHOOLS AND HOSPITALS
FOR MUNICIPAL PARK SYSTEMS AND GOLF COURSES

THIS ONE MOWING OUTFIT DOES THE WORK OF TWO CUTS DOWN CUTTING COSTS

The Worthington Parkover Mower cuts both low and tall grass. The gang of three trailer mowers cuts a swath of lawn 7½ feet wide. The sickle bar attachment cuts the roughs and tall grass. The one Parkover does the work of two separate mowing outfits.

When the trailer mowers are in use, the sickle bar cutter is folded up on side of tractor. When the sickle bar is in use, the three trailer mowers are lifted up. Sickle bar is easily detachable.

The big airway tires pad softly over the grass or roadway. Neither packing them down nor marking them. Curbs 10 inches high can be run over without harm to either machine or curb.

Mowers cut at rate of 10 miles an hour, or can run from one location to another at 15 miles. Consume so little as ½ gallon of gas an hour. It's the only machine made combining the two kinds of mowers. Send for special circular giving full information and prices.

Section V

BUILDINGS AND EQUIPMENT FOR PHYSICAL EDUCATION AND PLAY

Recreation and Play-Field Design for the Junior High School

BY WILLIS THOMSON

PRINCIPAL, ISAAC E. YOUNG JUNIOR HIGH SCHOOL, NEW ROCHELLE, N. Y.

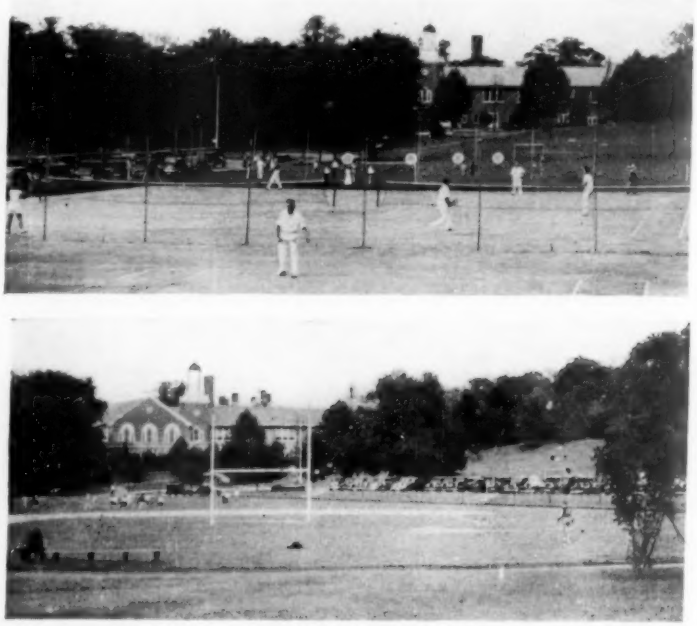
AN inspection of the sites upon which recently built junior high schools have been placed leads to the conclusion that there is no widespread philosophy concerning the programs of activities that should be developed outside the walls of the building. In one locality new junior high schools will be found on commodious plots, and in a nearby city the new schools will be built within a few feet of the surrounding sidewalks.

A discussion of junior high school sites can be simplified by supposing a model school of 1,000 pupils. The site for such a junior high school should contain not less than 15 to 20 usable acres. Often the building is so placed on the site that quite a bit of the ground can be used only as an ornamental park, and if the amount of such ground is considerable it should not be counted in the above acreage.

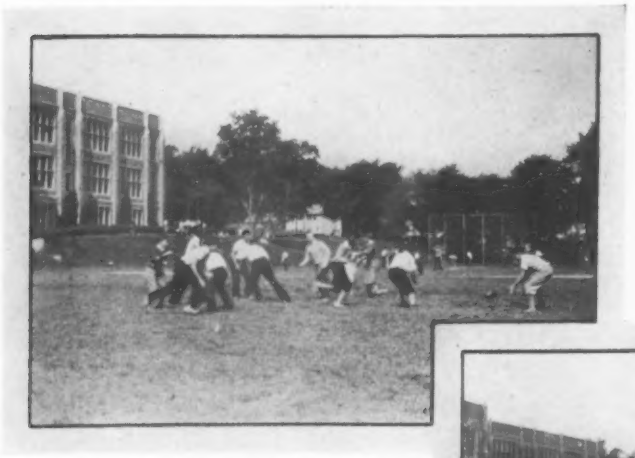
The Activity Program

The type and scope of the outdoor activity program that the school will develop should be planned before the site is selected. If the school is to indulge in interscholastic athletics, the grounds will not need to be as large as they would be if athletics were restricted to intramural competition. There has been a marked tendency to let the junior high schools ape the high schools, which in turn have aped the colleges. In some communities the school authorities have successfully resisted pressure to develop a system of interscholastic athletics in the junior high school, and in most of these localities successful intramural programs have evolved.

After school in the fall the boys will play either football, touch-football, or soccer. If sufficient money has been provided by the Board of Education to purchase enough shoulder pads, headgears, jerseys, and football pants to equip six to eight teams, regular football may be played. The equipment would have to be given out daily and checked in at the close of the games. Although this is done successfully at some colleges (at Harvard a clean suit of underwear is issued as well as the suit) it would be difficult, but not impossible, to do it in a junior high school. It is certainly unwise for a school to sponsor intramural football unless all boys are equipped properly, and nowadays very few boys of junior high age have the money to purchase adequate football outfits. Because of this difficulty of securing adequate equipment the average school should devote its energies to developing touch-football or soccer. (And incidentally, the boys will enjoy the game more if a special "touch" ball is used,



TENNIS COURTS AND FOOTBALL GROUND AT THE JUNIOR-SENIOR HIGH SCHOOL, SCARSDALE, N. Y.



TOUCH FOOTBALL AND SOCCER ON THE GROUNDS OF THE ISAAC E. YOUNG JUNIOR HIGH SCHOOL, NEW ROCHELLE, N. Y.

which is somewhat easier to handle and throw than the regulation football.)

If the program has received the proper impetus, and has grown during several years, about half the boys in the school will join the touch-football and soccer leagues. This means that 250 boys (considering that the school under discussion has 1,000 pupils) will be on the 21 or 22 teams. Each team should play at least twice a week, and this means that 22 games would be played each week. Inasmuch as the fields will have to be at least three-fourths the size of regular football fields, this part of the program will require almost the space of four football fields.

There should also be tennis courts to accommodate both boys and girls. For a school of one thousand children four to six tennis courts will find constant use during the fall and spring seasons in the northern part of the country, and fairly constant use in other sections of the country.

The Girls' Activities

The program for the girls can consist of a number of activities in the fall, but field hockey seems to be the most popular. In a school of one thousand, if intramural athletics have been successfully developed, about one-third of the girls will join a field hockey league. Such a program can be accommodated on two football fields, though most schools do not give more than one field to the girls. With the increasing participation of young girls in athletics, it would be wise to provide more space for the girls. In one school with which the writer is familiar, the girls of the eighth and ninth grades are eligible for the field hockey league, while no after-school program is provided for the seventh grade girls. In this particular school more and more of the parents are demanding that a program be offered for the seventh grade girls, although this is impossible because of site limitation.

Other fall activities should be given to the girls. Archery goes through periods of popularity, and during such seasons girls should be given the opportunity of enjoying it. An archery range itself does not take up a great deal of room, provided it can be located away from the general athletic fields and away from ground traffic. On most school sites a sequestered area can be found for archery, but in the planning of new grounds definite provision should be made for the range.

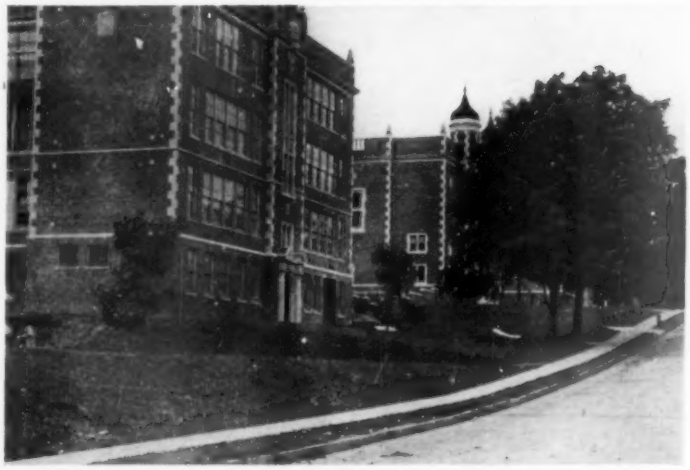
The spring athletic program will usually consist of track, field events, and baseball for both boys and girls. Tennis will also be one of the major activities if enough courts are provided. Fully half of the eighth and ninth grade boys will join a baseball league if it is properly conducted. About one-fourth of the seventh grade boys will join such a league, although careful preparation during the year will bring more boys into such an organization. In a junior high school of 1,000 pupils this will mean that about 220 boys will join the leagues. There should be two or three leagues, and these should be divided into one minor and two major leagues. About twenty teams will be formed, and if each team plays twice a week, twenty games will have to be played weekly. Inasmuch as only one game can be played on a diamond on any one day after

school, four baseball diamonds will be needed to accommodate these leagues for the boys.

The after-school athletic activity for the girls will probably be playground baseball in the spring, and two playground diamonds will be necessary to accommodate their program. In a very few years this space would probably not be adequate for the girls.

In a number of junior high schools active playground ball leagues have been developed. The games are usually played during the lunch hour. If the site is adequate for the after-school program, there will be plenty of room for the noon activities.

On some junior high school sites grandstands have been erected. A grandstand takes a great deal of space, and it wastes even more land because it invariably splits a site into several small and useless areas. A running track has this latter effect, too, and unless there is a great deal of land, a running track should not be laid down. Track events in a junior high school can be run on sod, unless the junior high school insists upon stimulating its track activities to the point where it will simultaneously attain great juvenile speed and heart strain.



THE EASTVIEW JUNIOR HIGH SCHOOL, WHITE PLAINS, N. Y.

The Outdoor Theater

The outdoor theater is not common in America, but it will probably become so. There are many lovely entertainments within the compass of the junior high school if there is a suitable outdoor place for their presentation. In some places the limitations of the auditorium have caused the school authorities to hold the commencement exercises out of doors. The outdoor theater can easily be made to have twice the capacity of the auditorium, and the holding of a commencement in such a place enables even the cousins and aunts to hear the girls' glee club sing the Miserere, and the speaker tell the class that the greatest of all the virtues is the ability to save money. But at other times an undulating melange of green foliage, colorful costumes, the faces of children, can make here a pageantry of such surpassing beauty that it gives a moment of drama to our own lives.

With the increase of leisure that economists see just around the corner, gardening will become one of the great leisure occupations. It has been said by Dr. Briggs that one of the functions of the junior high school is to teach boys and girls to do better those things that they will do anyway, and if this is true there should be a place for school gardens in the junior high school curriculum or club program. One objection to gardens has been the fact that the schools are closed during the summer. The school playground should remain open all summer, and one of the instructors assigned to summer duty ought to be able to carry on the garden work to its completion. If all the interests of the children are to be ministered to, there will have to be poultry yards, gardens and nurseries on the school site as well as play fields, school buildings, and service areas.

Summary

In planning for play and athletic areas on the site, other important needs must not be overlooked. In surveying the needs of just the present generation the author recommends that the site of a junior high school housing one thousand pupils include space for the following facilities:

1. A park in front of the building (unless the athletic field is placed in front; see illustration of the Young School). This should be large enough to take the building away from traffic noises.
2. Six soccer or touch-football fields, convertible into six baseball diamonds.
3. Six tennis courts.
4. An adequate service area. The building should be so designed that the approach to this will not be near classrooms.
5. An outdoor theater.
6. A parking space for faculty cars. (In localities where the age limitation on drivers' licenses is low, the parking space will have to be large enough to accommodate students' cars also.)
7. A space for garden, nursery, and poultry projects.
8. An archery range.

Indoor Play Facilities for College Women

BY GAVIN HADDEN, C.E.

"IN what order would you rate the following play facilities, with respect to their usefulness in a women's gymnasium, disregarding the always present restrictions of cost and space?

Basketball
Swimming Pool
Squash
Running Track
Indoor Tennis
Bowling
Fencing
Badminton
Volley-ball
Calisthenics and Dancing
Apparatus Exercises
Indoor Baseball
Jumping, Vaulting, etc.
Golf Net

"Would you suggest any other play facilities in preference to any of those listed above?"

In helping to determine recently the most desirable facilities to provide for in the design of a proposed gymnasium at a women's college, the writer sent out to a number of women's colleges a questionnaire containing these questions. Other questions were also asked, bringing many useful opinions on matters of design, involving primarily those features in which a women's gymnasium differs from a men's, but the questions set forth above elicited the most generally interesting and useful information of all.

It might be an interesting pastime for the reader to stop here and mark with numbers from 1 to 14 each of the activities (or facilities for them) which are included in the above list in his or her order of preference for a women's college, and then turn for comparison to the list representing the collective opinion as obtained from the questionnaire, which is printed later in this article.

The Replies

Answers to the questionnaire were received from the following institutions: University of Michigan; Middlebury College; Mt. Holyoke College; New Jersey College for Women; New York University; Northwestern University; Pembroke College; Radcliffe College; University of Rochester; Smith College; Swarthmore College; Vassar College; Westhampton College (University of Richmond).

Of these, 12 gave answers, in whole or in part, to the question on the rating of the various facilities. The answers were tabulated, each being given a uniformly weighted score for each rating, and then these scores were summed up for each item. The system used was to score in each case 1 for the item rated No. 1; 2 for the item rated No. 2; etc. Where two or more items had received the same rating, each was given the average score of the group; for example, if three items were rated No. 1, each of them was scored 2. The lower the score of any one of the facilities, therefore, the higher is its rating by the consensus.

The following tabulation gives the combined scores of the 14 different facilities, in the order given them by the 12 votes combined:

Rank	*Facilities*	*Combined Score*
1.	Swimming Pool	25
2.	Basketball	44.5
3.	Calisthenics and Dancing	45.5
4.	Indoor Tennis	70.5
5.	Badminton	75
6.	Squash	82.5
7.	Golf Net	86.5
8.	Bowling	94
9.	Volley-ball	96.5
10.	Indoor Baseball	110.5
11.	Fencing	116
12.	Apparatus Exercises	117.5
13.	Jumping, Vaulting, etc.	136.5
14.	Running Track	162.5
	Total score	1,263.0

(The total score for each 14 ratings should be 105 and $12 \times 105 = 1{,}260$; the additional 3 points in the total were caused by giving a score of 15 to each of two items which were definitely ruled out by one answer, instead of scoring them 13 and 14).

There are a number of points which are of special interest in this tabulation, expressing as it does the combined views of a number of experienced administrators of athletics for women. Before discussing them, however, it is worth while to point out the surprising unanimity of the answers, a fact which cannot be made clear from the tabulation itself.

The average difference for all the answers, between the ranking given for each item and the ranking shown by the consensus, was less than 2.2 places; the rankings given in one of the answers were so close to agreement with the consensus that the average difference was only nine-tenths of one place, with 6 of the 14 rankings coinciding exactly. Such unanimity would seem to indicate that the results may be regarded as unusually reliable for an investigation of this kind.

Some Individual Ratings

The markedly high place given to Swimming Pool should be particularly noted; seven of the twelve answers ranked this item No. 1, either alone or with one or more other items; the other five ranked it No. 2. Also, the low rankings given to Running Track and to Jumping and Vaulting are worthy of note. These were perhaps to

be expected, but the relatively high place given to Golf Net and the comparatively low place given to Fencing may be considered as indicative of a somewhat unexpected trend.

The high rating of Calisthenics and Dancing also deserves comment. These two were combined in the question primarily because the same facilities are required for both; but it seems possible that if they had been given as separate items, Dancing alone might have been rated somewhat higher and might have been ranked ahead of Basketball. In one answer the two items were rated separately, Dancing being designated No. 1 and Calisthenics No. 12. In scoring this answer, the lower score (1) was given to the two combined, for it is felt that facilities suitable for both activities should be given the benefit of whichever ranking was the higher.

The second question in the questionnaire, quoted above, asked for other preferred play facilities not listed. Nine of the answers contained some suggestions of this kind, as follows, the number given with each item representing the number of answers in which it was recommended:

Indoor Archery	7
Deck Tennis	4
Handball	2
Games Room (ping-pong, quoits, shuffle-board, etc.)	2
Rifle Range	1

In addition to these, some of the answers to this question suggested facilities other than those for play (Lounge or Social Room, Corrective Room, etc.) but as these were not intended to be included in this question, and as most of those answering the questionnaire presumably realized this, the number of those making these additional suggestions has no value.

Players-per-Corter

For those planning the construction of any of the facilities for women listed in this article, it may be useful to make comparisons not only on the basis of "usefulness," but also on the basis of the relative amount of space required. Some years ago the writer prepared a graphical study of the number of players-per-acre accommodated by various popular outdoor sports, including both men's and women's activities. The variation shown by this study extended from less than one player-per-acre for polo to about 29 players-per-acre for lawn tennis. In order to obtain a similar comparison for indoor activities, the writer adopted the "corter" as a new unit of measurement, since the acre is not suitable for measuring indoor floor areas, and there happens to be no other convenient unit available. One "corter" equals 5,000 square feet of floor area—a good round number, convenient to use and easy to remember, and approximating the area of numerous fair-sized gymnasium rooms. This unit has also the advantage of representing just about the area required for one standard full-sized basketball court, which makes it easy to visualize.

In the following tabulation, the various different games and activities are listed in the order of the number of players-per-corter which they accommodate. In calculating the figures for this table, it has been necessary to make a number of reasonable assumptions, not only as to the areas required by the participants, but also as to the number of participants in a single activity. The policy has been, in general, to use the maximum reasonable number of participants and the minimum reasonable areas, and for some of the team games (such as basketball), in which substitutions are frequent, allowance has been made by increasing the number of players taking part.

The table follows:

Game	*Players-per-Corter*
1. Apparatus Exercises	100
2. Calisthenics	100
3. Dancing	100
4. Running (Indoor Track)	100
5. Swimming	100
6. Volley-ball	67
7. Miscellaneous Games (ping-pong, quoits, shuffle-board, etc.)	60
8. Basketball	45
9. Archery (range)	40
10. Rifle (range)	40
11. Bowling	32
12. Fencing	25
13. Golf Net	25
14. Indoor Baseball	24
15. Deck Tennis	20
16. Handball (4 walls)	19
17. Handball (1 wall)	17
18. Squash Racquets	17
19. Squash Tennis	17
20. Jumping, Vaulting, etc.	12
21. Indoor Tennis	3

This table is a useful guide to the relative cost of the various activities, but it should be used with great care. Although the area required per player is nearly proportional to the cost for outdoor games, this is not true of indoor games, because the cost of the latter is influenced largely by other considerations also, such as headroom, roof spans, wall areas, surfacing materials, lighting, heating, ventilating, and such special installations as swimming pools and their equipment.

The Proposed National Grandstand Code

BY S. W. HOMAN

ASSISTANT DIRECTOR, BUREAU OF INDUSTRIAL STANDARDS, DEPARTMENT OF LABOR AND INDUSTRY, HARRISBURG, PA.

THE development of the proposed national grandstand code is interesting, not only as a means of promoting public safety, but as suggesting a method whereby any local regulatory group can cooperate with an interested national group to the advantage of all concerned. Under the provisions of a state law, the Pennsylvania Department of Labor and Industry is required to draft and enforce regulations for the protection of persons in public assemblages. But instead of developing a code of its own, the Department called upon the American Standards Association to develop a national safety code for grandstands with the intention of embodying the completed standards in the state regulations. Since persons who could not devote their time to an individual state or local project feel free to contribute their time and knowledge to a national project which will benefit all regulatory groups, such a plan does not limit the state or local territory to such technical talent as may be found within its own confines. In this particular case, the American Standards Association appointed a committee of 24 members representing 25 different national associations interested in such a proposed code.

Thorough Preliminary Study and Experimentation

Inasmuch as grandstand construction from a regulatory standpoint was an entirely new project, the committee began its activities by reviewing all the literature on the subject. Much information was collected in this way, and the cause of all known grandstand collapses was determined so far as possible. Working from another angle, the committee conducted a series of experiments to determine definitely the forces set up by the occupants of grandstands under certain actions of occupants, such as massed cheering, sudden rising, etc.* These forces had never before been measured, and the information derived from these experiments gave a definite value for design purposes in calculating the sway load.

After three years of intensive work, the committee drafted a code covering the erection of portable grandstands, on which public hearings were held in order to give manufacturers an opportunity to discuss and criticize the provisions. Although this proposed national code has not yet been formally approved by the American Standards Association, it became effective in Pennsylvania in August, 1933.

* Cf. report published in American Standards Association Bulletin, April, 1932.

Both steel and wood stands are covered by the regulations. In treating steel structures the standard specifications of the American Institute of Steel Construction are used. In calculating wood structures, the allowable unit stresses as recommended by the American Forest Products Industries are used. Allowable unit stresses for bending in beams, and for columns for different L/D ratio are given for all different types of wood.

Regulations Fundamental to the Construction of Grandstands

As copies of the state regulations, identical with the proposed national code, may be secured by writing to the Pennsylvania Department of Labor and Industry, at Harrisburg, it is not necessary to mention all the details in this discussion. However, certain of the regulations, basic to all grandstand construction, might well be cited:

1. The seat and foot boards shall be designed to support not less than 120 pounds per linear foot.

2. All other parts of the grandstand shall be designed to support a definite combined live and impact load, dependent upon the back-to-back distance between seats. This varies from 130 pounds per square foot for 22 inches between seats to 100 pounds per square foot for 27 inches or over between seats.

3. All grandstands must be designed to support a sway load of 24 pounds per linear foot of seats applied parallel to the seats, and 10 pounds perpendicular to the seats.

4. Provision must be made in the design of the grandstand so that misalignment or settlement of the ground under the supports does not affect the safety of the structure.

5. Handrails are required on the back and sides of grandstands more than 4 feet above the ground.

6. The sum of the width of seatboards and footboards shall not be less than 17 inches, and the minimum width of either seat or footboard shall be 7½ inches.

In the past few years several major accidents and many minor ones have occurred in which occupants of grandstands have been badly injured. Since some of these casualties were undoubtedly due to poor design and inferior construction of the grandstands, a uniform code should do much to eliminate such accidents if its use becomes universal.

Space Requirements for the Children's Playground

Summary of a Comprehensive Statement Worked Out by the National Recreation Association in Consultation with the Recreation Department of the Russell Sage Foundation

THE discrepancy between various proposed playground space standards has been due in large measure to a lack of agreement or understanding as to the essential functions of the children's playground. The term is variously applied to special areas for the use of children up to ten or eleven, to school yards intended primarily for use in connection with the physical education program, to sections in parks provided merely with apparatus and other play facilities, and to vacant lots used for children's play. These areas, however, seldom provide all the facilities essential to a well-balanced play program. Any attempt to determine space standards must take into consideration all these essential requirements. The children's playground may therefore be defined as an attractive outdoor play area providing opportunities primarily for children between the ages of five and fifteen to take part in a variety of fundamental and enjoyable play activities.

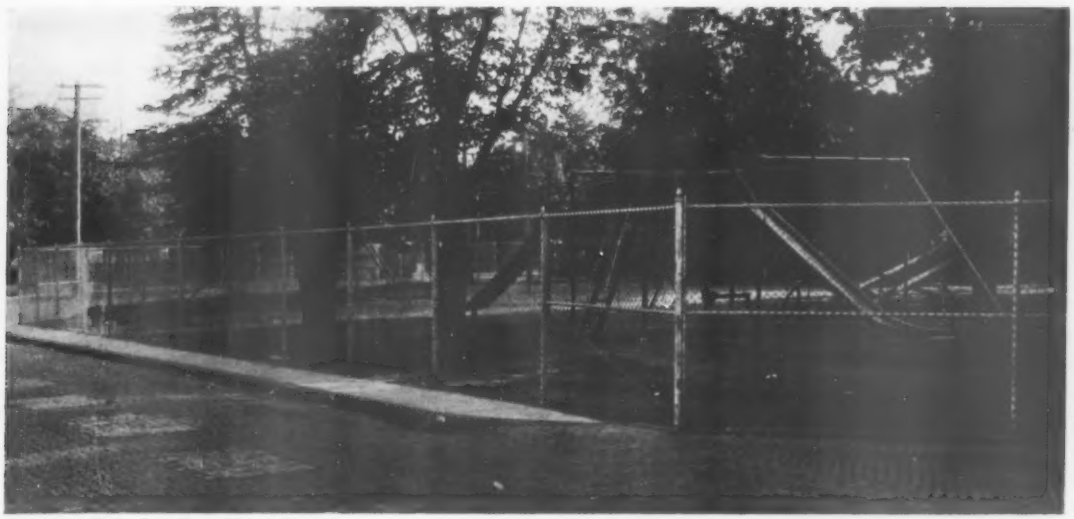
Frequently the children's playground is situated at or near an elementary school, although it is often in a park or special play area. The ages, needs and interests of the children it is to serve, however, are essentially the same regardless of its location, and the same space and facilities should be provided. Naturally the number of children to be served will influence the amount of space and the number of facilities needed on the playground. Nevertheless, if the various interests and needs of the children of different ages are to be met, a minimum area must be provided regardless of the number of children. It may be assumed that where the population is dense, playgrounds should be provided at more frequent intervals than in neighborhoods composed of single-family houses. Therefore the space requirements for the children's playground will not vary greatly under different urban or suburban conditions. On the other hand, rural or sparsely settled communities present conditions requiring special study, and they are not covered by this statement.

The various play needs and interests of children afford a most reasonable basis for approaching the problem of space requirements, and a study of the facilities and areas required to meet them indicates that normally between 3½ and 4 acres are required in order to provide an adequate playground program. In arriving at this standard the requirements in the way of spaces and facilities essential to the following activities and services have been taken into account: (1) physical activities and team games commonly included in and universally recognized as essential to both school physical education programs and after-school, noon-hour and vacation playground programs; (2) other play interests and activities—rhythmic, manual, music, dramatic, nature and craft; (3) free play activities, such as swinging or wading, which the children enjoy, apart from their educational and health values; (4) playground beautification; (5) free circulation, paths and safety zones. Any area which is intended to serve as a children's playground should meet all these requirements, and no space standard can be considered sound which fails to take them into account.

The following is a list of the facilities, game areas and other features which are considered essential or important on a playground to serve a neighborhood with 600 children from five to fifteen years of age. The space requirements represent not only the area actually occupied by the various features but the additional space surrounding it which cannot be otherwise utilized. The approximate number of children who can be served at one time by the various features is also indicated.

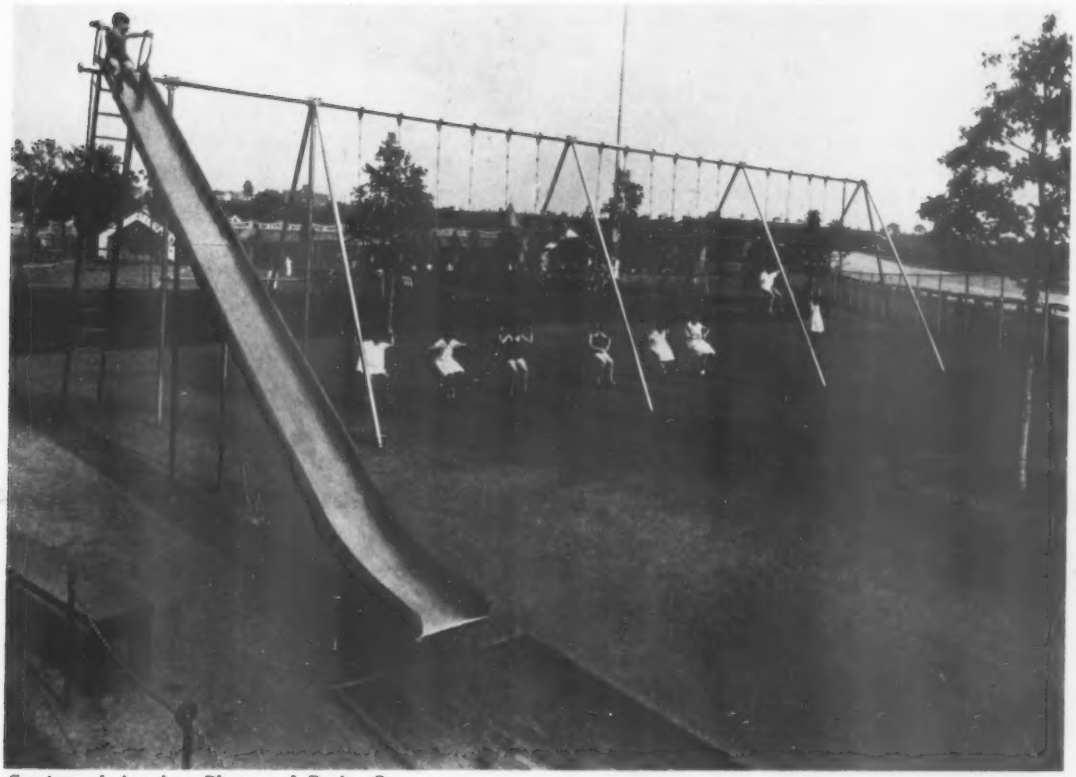
Facility and Area	*Square Feet Required*		*Child Capacity*
Apparatus	7,700		122
Open space for young children's play	11,200		105
Wading pool	3,000		40
Handcraft and quiet game area	1,600		30
Outdoor theater	2,000		30
Sand boxes (2) and building-block platform	1,000		50
Shelter house	2,500		30
Areas for games and sports (Soccer field; 2 playground baseball diamonds; volleyball court; basketball court; jumping pits; 2 paddle tennis courts; 2 handball courts; 2 tether tennis courts; 2 horseshoe courts; 2 tennis courts; straightaway track)	109,975		156
Landscaping	6,000		
Additional space for paths, etc.	7,000		
Total	151,975	(3.49 acres)	563

It will be noted that the standard playground of 3½ acres, with the apparatus and facilities listed above, will accommodate 563 children at one time when every feature is used to capacity. It is probable that rarely will as many as 500 children be present at any given time. The average amount of space per child which the playground affords when used to capacity is 270 square feet. It is obvious that the space required for each child taking part in organized games and sports is several times greater than that required for the children engaged in play on the apparatus,



Courtesy of Anchor Post Fence Co.

THIS PLAYGROUND AT A PUBLIC SCHOOL IN SEWICKLEY, PA., IS ENCLOSED FOR THE CHILDREN'S SAFETY



Courtesy of American Playground Device Co.

SWINGS AND SLIDE IN A WELL-CARED-FOR PLAYGROUND FOR YOUNG CHILDREN

in the wading pool, at quiet games, or handcraft activities. The latter groups require less than 100 square feet per child, the standard recommended by the Regional Plan of New York and Environs.

It should be recognized, however, that the children over ten years of age are primarily attracted to the playground by the team games and sports which require large spaces. These activities are considered of primary importance to the growth of the children and to the development of cooperation and the team spirit. Opportunities to take part in these activities must be provided if the playground is to serve the eleven- to fifteen-year-old children. An area of 3½ acres or more is required if the playground is to afford the facilities desired by and desirable for children of this age group, who comprise a large percentage of the attendance on many playgrounds. This requirement coincides very closely with the standards of playground space recommended by leading educational and park authorities.

The Junior Playground

Where for some reason it is impossible to acquire adequate areas, smaller playgrounds will render valuable service, especially if their use is restricted to children up to ten or eleven years of age. Most of the activities of young children require less space than those of the older ones. A few of the types of apparatus recommended for the "standard" playground are not needed and several of the facilities and areas may be reduced in size where only young children are to be served. The greatest saving, however, is in the special areas for games and sports, many of which can be omitted. A summary of the requirements for the "junior" playground indicates that an area totaling 50,100 square feet, or approximately 1.15 acres, is required in the same neighborhood unit as was used in determining the requirements for the "standard" playground. Such a neighborhood is likely to have approximately 400 children from 5 to 11 years of age. The "junior" playground used to capacity can accommodate 394 children at one time, although the attendance at any time would likely be much smaller. When used to capacity, the average space used per child would be 127 square feet.

The conclusion is therefore reached that the play needs of children up to ten or eleven require an area less than one-third as large as do those of children up to fifteen. It is important to keep in mind the fact that whereas 1.15 acres, wisely laid out and administered, may be highly satisfactory for the play of young children, such an area is wholly inadequate for boys and girls eleven to fifteen years old, whose play life and needs are of vital concern to parents and the community. Only under very exceptional conditions will communities find it justifiable to establish the junior playground rather than to care for the entire child population on a "standard" playground.

Adjusting the Standard to Varying Numbers of Children

As previously stated, certain equipment, facilities and areas are needed to supply a well-balanced play program, regardless of the number of children to be served. However, it is obvious that more equipment, facilities and game areas will be needed in a playground serving a neighborhood with 1,000 children than in one with only 200. Where the child population to be served is greater than 600, the number previously considered, it is necessary to add certain pieces of apparatus, to enlarge the space allotted for some of the facilities and to increase the number of game courts. The process is reversed in the case of the sparsely settled neighborhood.

The following table suggests the minimum area which, it is believed, will adequately serve the play needs and interests of varying numbers of children. It is important to keep in mind the fact that not only the present but the estimated future child population of a neighborhood should be considered in applying these suggested standards.

Child Population to Be Served	*Minimum Size of Playground Needed*		*Average Square Feet per Child Population*
	In Sq. Feet	In Acres	
200	100,000	2.29	500
300	111,250	2.55	371
450	133,000	3.05	296
600	151,975	3.49	253
800	194,000	4.45	243
1,000	233,230	5.35	233
1,200	272,000	6.25	227

The preceding table illustrates the fallacy of determining playground space requirements solely upon a uniform "square feet per child" basis.

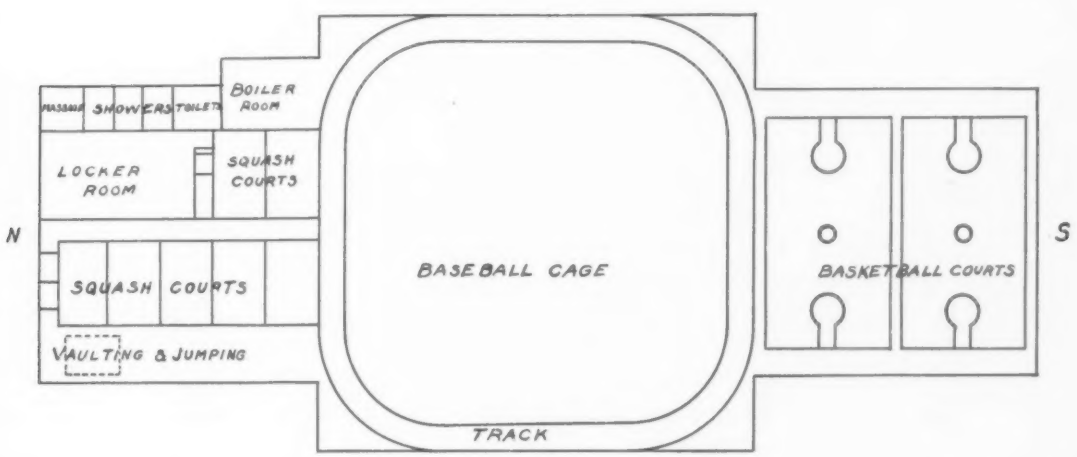
EDITORIAL NOTE.—The complete statement summarized in the foregoing article is available in pamphlet form, at 25 cents each, from the National Recreation Association, 315 Fourth Avenue, New York.

The Winter Exercise Building at The Choate School, Wallingford, Connecticut

BY REV. GEORGE C. ST. JOHN
HEADMASTER

FOR about twenty-five years it has been realized that the greatest handicap of a New England school is the uncertainty of the weather. The only thing certain about New England weather is change. In whatever part of that section a school is situated, there is no getting away from those periods at the beginning of winter and at the end of winter and from that period called a "January thaw"—which may come in any winter month—when the ice goes out from under us, coasting and skiing suddenly stop, and all the earth turns to mud.

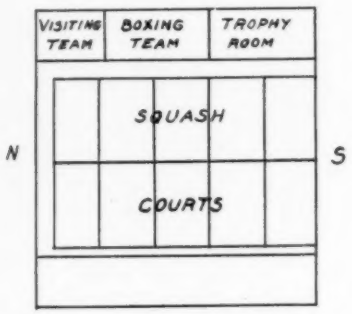
For years the masters who coach athletics in The Choate School have had a vision of a winter exercise building which would make a New England school independent of weather. For years the whole Faculty—because nearly every man in the Faculty coaches, or helps with athletics in one way or another—has been planning. Gradually evolving architectural plans of a winter exercise building were in the Masters' Club Room for more than three years before the present Choate Winter Exercise Building was begun. Every master who had a new idea about the building wrote his thoughts down, and attached them to the plans. At the end of three years scarcely a line of the original plans remained; but a building has been evolved which works out



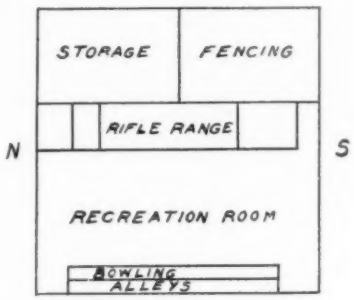
FIRST FLOOR PLAN

so well for the School's purposes that—now it is built—we would not make a single change.

Incidentally, one of our architect alumni, Lewis Coffin, of the firm of Polhemus and Coffin, made the building beautiful. The architect of what might be called the skeleton or the engineering part of the building was H. W. Andrews.



SECOND FLOOR PLAN
NORTH END



GROUND FLOOR PLAN
SOUTH END

Mr. Andrews and Mr. Coffin worked constantly and most harmoniously together; and they included in the building every thought, both for practical worth and for beauty, which the masters of the School had planned and hoped for.

The accompanying pictures and ground plan show something of the building, but not all. It contains a baseball cage, frequently used for ground hockey and for three tennis courts, as well as the other sports; a circular running track, a straightaway, with space for hurdles, high jumps, and pole vaulting; seventeen squash courts, two basketball floors; lockers, showers, lavatory and toilet room; doctor's room; rooms for visiting teams; trophy room, spectators' galleries; shooting galleries; wrestling and fencing rooms; bowling alleys; play room for pool, ping pong, deck tennis, shuffleboard and tuck shop; and space for out-of-door handball.

The main objective of the building has been to meet fully the winter exercise needs of a school where athletics are carried out in the special way they are conducted at Choate. Perhaps the main interest in studying the building is to see how it has evolved to serve the needs of the School so well that there have been no regrets since it was finished.

PRINCIPAL TYPES OF EQUIPMENT INSTALLED

Boilers—Pacific Steel Boiler Corp.
Clocks and Signal Systems—Warren Telechron Co.
Heat Regulating System—C. A. Dunham Co.
Lighting Globes and Fixtures—General Electric Co.
Lockers—Hart & Hutchinson Co.
Roofing—Johns-Manville
Sanitary Equipment
Drinking Fountains—American Radiator & Standard Sanitary Co.
Toilets—American Radiator & Standard Sanitary Co.
Lavatories—American Radiator & Standard Sanitary Co.
Urinals—American Radiator & Standard Sanitary Co.
Valves—Crane Co.; Jenkins Bros.
Piping—Crane Co.
Shower Heads—Speakman Co.
Toilet Partitions—Hart & Hutchinson Co.
Architect—Lewis Coffin
Engineer and Designer—H. W. Andrews

ANCHOR POST FENCE COMPANY

Complete Line of Playground Equipment

Baltimore, Md.

Sales Offices in Principal Cities

ANCHOR'S COMPLETE SERVICE FOR SCHOOL PLAYGROUNDS

The Anchor Post Fence Company has been serving the playground market all over the country for more than forty years, providing durable, protective chain link fence for thousands of playgrounds. The Company now offers in addition a complete playground equipment service:

We can furnish you playground devices and Baseball Backstops to equip your playground.

We can provide you with an Anchor Fence to enclose your field.

We offer you the services of skilled mechanics to install both equipment and fence.

The desirability of transacting business with a single organization for your entire playground requirements cannot be too greatly emphasized, for in this way you get a **complete service** with **undivided responsibility.**

Three Popular Members of the Anchor Playground Line

1. **The Merry-Go-Round** (Type No. M-1.)

This is a safe and economical piece of play equipment —safe, because the running board is close to the ground, thereby preventing a child's getting under, or partly under, it; economical, because it will accommodate as many as forty children at a time, therefore it is the cheapest device per passenger accommodated. Operation is so free and easy that one child can start and keep it running. The outfit is shipped in sections and, because of its simplicity, can be easily erected in a short time. Assembling instructions are furnished with shipping papers.

2. **Gym Outfit No. B-4.**

This outfit was designed by request and has proved to be one of our best sellers. The purchaser has an option in ordering this unit. Aluminum flying rings or steel trapeze can be furnished instead of the ladder and climbing pole. The overall length at top is 36 feet; at ground, 50 feet. The height is 14 feet. Pipe required: 1 piece 3½-inch pipe 21 feet long; 1 piece 3½-inch pipe 15 feet long; 8 pieces 2½-inch pipe 17 feet long; and 2 pieces 2½-inch pipe 16 feet long. All pipe dimensions are outside diameter. Three men can install this unit in 15 hours. Weight: apparatus, 360 pounds; pipe, 900 pounds.

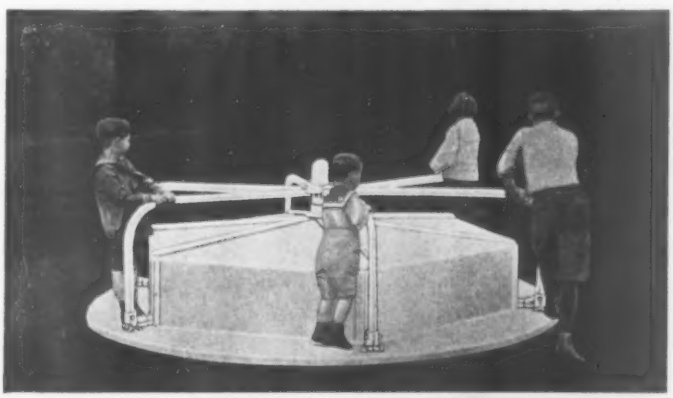
3. **Swing Set.**

The picture below (at right) shows a three-swing set, but any number of sections will be furnished to give as many swings as desired, in multiples of three. The framework is 12 feet high and is made of 3½-inch O. D. horizontal and 2½-inch O. D. support pipes. A choice of three types of swing seats is offered.

Write for illustrated booklet, "Anchor Playground Equipment."

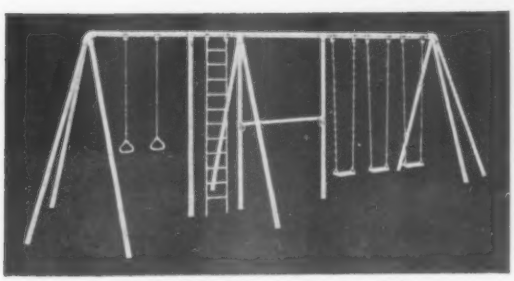
The Anchor line includes:

The Ocean Wave
Self-Propelled Swings
Merry-Go-Rounds
The Giant Stride
The Kiddy-Go-Round
Horizontal Ladders
Single Chute Slides
Double Chute Coaster Slides
See-Saws
Swing Sets
Traveling Rings
Gym Outfits

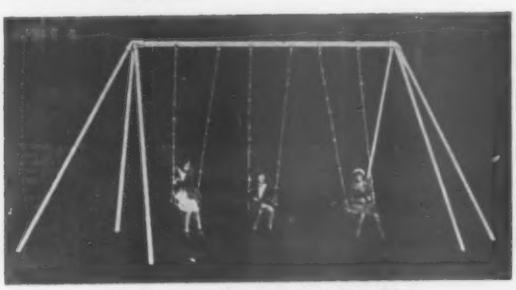


Chain Link Tennis Fences
Chain Link Wire Tennis Nets
Basketball Equipment
Baseball Backstops
Flood Lights for Night Sports
Steel Flag Poles
Water Slides
Diving Towers and Springboards
Life Guard Look-out Chairs
Pool Ladders

The Merry-Go-Round Is Safe and Economical



The Popular Gym Outfit No. B-4



Swing Sets Are Always Popular

ATLAS PORTABLE BLEACHERS

2170 East Jefferson Ave.
DETROIT, MICHIGAN

FOR INDOOR AND OUTDOOR USE

When Selecting Bleacher Seats It Is Most Important to Consider Safety, Strength, Durability, Appearance, Comfort, Ease of Handling, Minimum Space in Transporting and Storing, No Upkeep

SPECIFICATIONS, ASSEMBLY—Each sixteen foot section a complete independent unit supported by FOUR stringer jack assemblies. No overlapping of seat and foot boards.

TRIANGULAR JACKS—2 x 4 long leaf yellow pine, securely bolted through the top and connected at lower end by an iron tie-strut.

STRINGERS—2 x 8 long leaf yellow pine, to which are attached IRON SUPPORTS FOR seat and foot boards made of malleable castings which straddle the stringer and are attached by bolts which pass through the stringer and both jaws of the castings.

STEEL LOCKING DEVICE—Consists of 1¼ x 1¼ angle steel tension rod to which are riveted malleable hooks, locking all jacks to nose of stringer.

SEAT BOARDS—1¼ x 10 clear Oregon Fir with rounded edges.

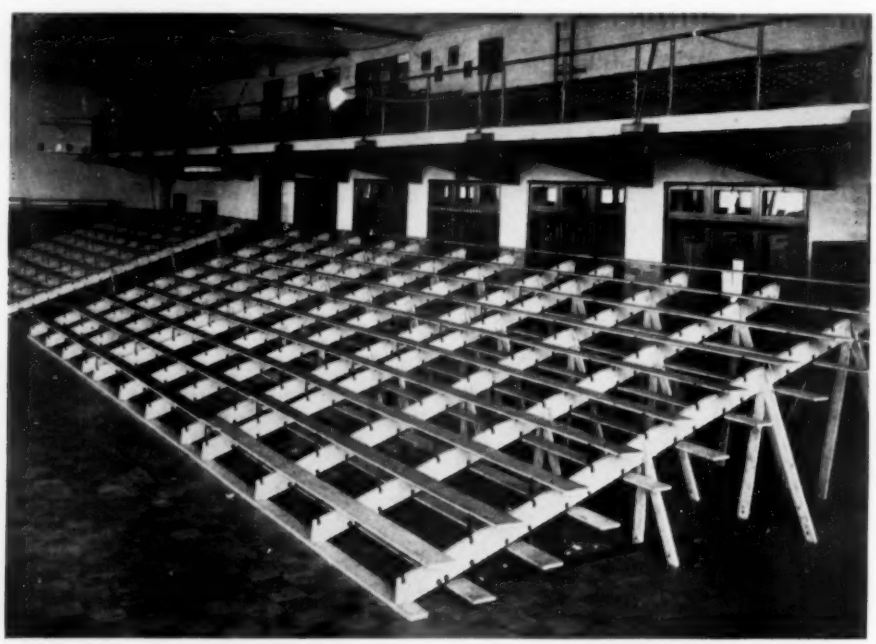
FOOT BOARDS—1¼ x 8 clear Oregon Fir with rounded edges.

NOSE REST—2 x 6 yellow pine.

PAINTING—All wood parts painted with best quality gray floor paint. All castings and steel, black enamel.

ELEVATION—Seats spaced 22 inch on stringers with 7½ inch rise or 24 inch on stringer with 12 inch rise.

GUARD RAILS—Furnished if desired.



BENJAMIN ELECTRIC MFG. CO.

General Offices and Factory: Des Plaines (Chicago Suburb), Ill.

230 W. 17th Street NEW YORK | 20 N. Wacker Drive CHICAGO | 448 Bryant Street SAN FRANCISCO

CAT. NO. 5752

BENJAMIN "PLAY-AREA" FLOODLIGHT

The Benjamin "Play-Area" Floodlight fulfills every requirement for the very best type of lighting for football and athletic fields. Uniform and diffused illumination is provided on the ground and to the front and sides of the unit. Adequate light is directed on vertical surfaces so that players and ball are plainly visible from any point. Part of the light is directed upward, permitting players and spectators to follow the ball in flight. Glare is minimized and does not interfere with the vision of players or spectators.

The fixture is durably built and absolutely weatherproof. The diffusing reflector is porcelain enameled green on the outside and reflecting white inside. The auxiliary inner reflector is oxidized aluminum. The reflector never requires painting or refinishing. All exposed metal fittings are cadmium plated. It is easily cleaned with soap and water. Nos. 5752 and 5752-A are bracket mounting types for enclosed wiring. No. 5754 is a cross arm type for open wiring and includes a bracket suitable for flat surface attachment, or when used with the pipe clamp furnished, can be attached to 1-inch or 1½-inch pipe.

Cat. No.	Lamp Watts	Description	List Price
5752	750-1500	With Bracket for 1½" Pipe	$31.00
5752-A	750-1500	With Bracket for 2" Pipe	31.00
5754	750-1500	With Bracket and Clamp	29.00

OTHER BENJAMIN FLOODLIGHTS

CAT. NO. 5825

Benjamin Floodlighting Projector. Closed Type. Weatherproof and adjustable. 200 to 1000 watt size lamps

CAT. NO. 5771

Benjamin "Ellipto-lite" Floodlight. Open Type. Pendent hood, universal or pole cap bracket types. 300 to 1500 watt sizes

Right: A Benjamin floodlighted football field. Night view with game in progress. Note clearness of illumination

For Layout Data and complete information and recommendations send dimensional sketch to nearest Benjamin office above.

CHICAGO GYMNASIUM EQUIPMENT CO.

Office and Factory
1831-1837 West Lake Street
Chicago, Illinois
Seeley 7213

Manufacturers of
The *CHICAGO* Line

New York Representative
BRADLEY M. LAYBURN CO.
461 8th Ave., N. Y.
BRyant 9-6774

Gymnasium, Basket Ball, Playground and Swimming Pool Equipment

REPRESENTATIVES IN ALL PRINCIPAL CITIES

BASKET BALL EQUIPMENT

Swing-up forward and backward type, wall extended types, wall fold-up type, portable stage and floor type, balcony type. Basket ball backstops to meet every building condition.

GYMNASIUM EQUIPMENT

Vaulting horses, bucks, parallel bars, horizontal bars, stall bars, gymnasium mats, flying and traveling rings, climbing poles and ropes, et cetera. Complete line of standard gymnasium equipment. Write for Catalog No. 5.

Engineering Service, Estimates, Blue-prints, Lay-outs, Specifications and Other Information Desired, Gladly Extended Without Obligation.

BEACH AND POOL EQUIPMENT

Standard and official diving boards, pool ladders, rescue poles, life buoys, life guard chairs, diving rings and bricks, coco matting, water slides, et cetera. Complete line of high grade equipment. Write for Catalog No. C.

High Quality Equipment, Scientifically Made, Standard in Design and Construction, Safe and Durable.

PLAYGROUND APPARATUS

Combination frames, standard swing frames, baby swings, see-saws, slides, merry-go-rounds, giant strides, ocean waves, horizontal bars, park benches, et cetera. Complete line of STURDY SAFE equipment. Write for Catalog No. B.

Manufacturers Since 1871

THE C. B. DOLGE COMPANY

MAIN OFFICE AND LABORATORIES

Westport Connecticut

STOP ATHLETE'S FOOT

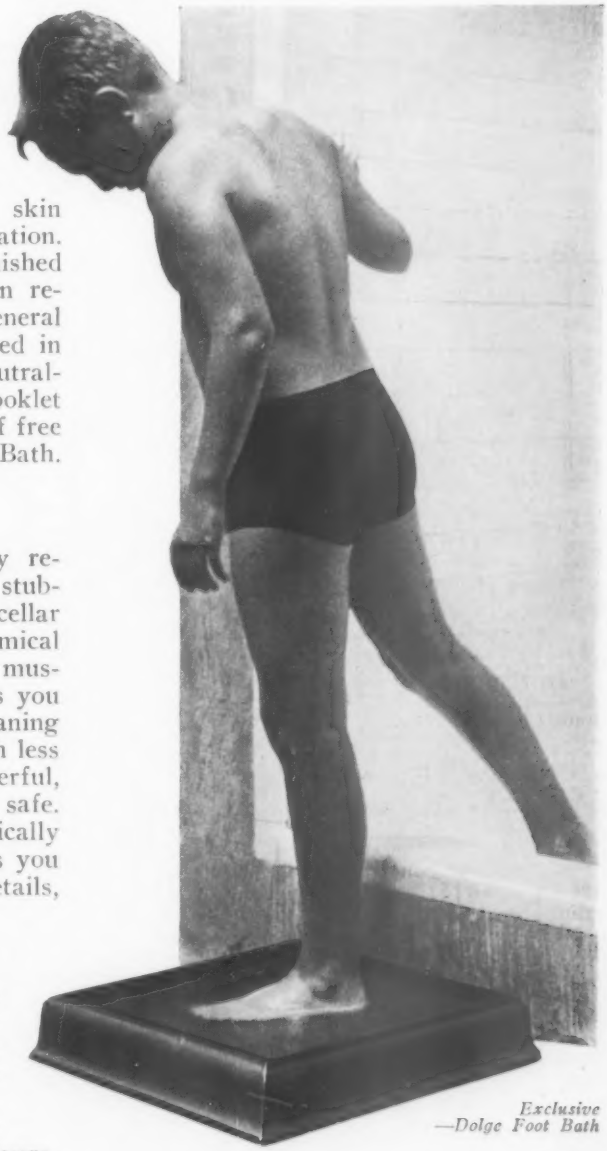
ALTA-CO, odorless antiseptic and disinfectant, diluted in water 1-to-10, kills Athlete's Foot fungi in less than 30 seconds. Used in foot bath or as floor wash, helps prevent spread of this skin infection. Excellent treatment, too: penetrates skin without loss of power, without irritation. Verbatim reports of eminent, distinguished dermatologists and bacteriologists on request—gladly. Alta-Co is ideal for general disinfecting and deodorizing. Sprayed in and close to bowls and urinals, it neutralizes foul odors—leaves no odor. Booklet E states full details—outlines offers of free sprayers—free Dolge Rubber Foot Bath. Write for it—no obligation.

DIRT DISAPPEARS

BAN quickly removes the most stubborn dirt from cellar to garret. Chemical energy replaces muscle power: gives you easier, better cleaning in less time, with less material. Powerful, but mild and safe. Cleans practically everything. Dolge free-test offer lets you try it out, without risk. Write for details, Booklet F, without obligation.

MAINTENANCE SPECIALISTS

DOLGE makes everything for the efficient, economical maintenance of sanitation and cleanliness in buildings —for the destruction of pests in buildings and on grounds. Full line includes variety of disinfectants, deodorants, insecticides, rodent destroyers, cleaning compounds, liquid soap and dispensing equipment, floor finishing compounds, drain solvents, worm eradicators, weed destroyers, etc., etc. Every product bears the 40-year reputation, the unconditional guarantee, which have made the name DOLGE a byword among men responsible for school maintenance.



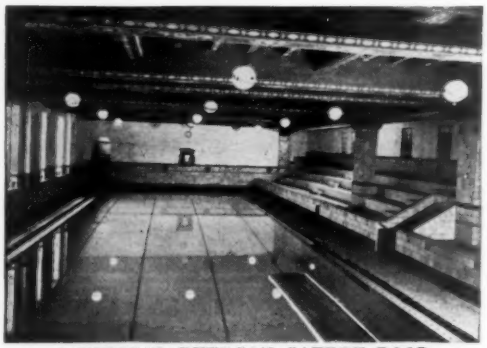
Exclusive —Dolge Foot Bath

EVERSON FILTER COMPANY

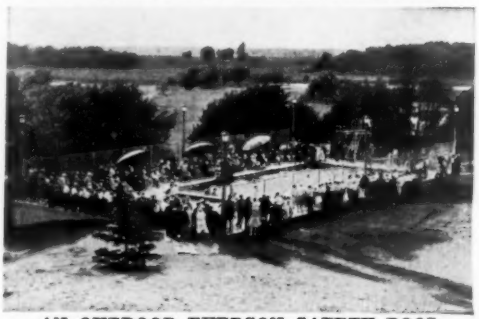
627 W. Lake Street, Chicago, Ill., U. S. A.

Everson Safety Swimming Pools

EVERSON Swimming Pools are safety pools that more than fulfill the most rigid Federal, State and Municipal health requirements. They embody a practical excellence resulting from over 30 years of specialization and unchallenged leadership in this field. During this time, EVERSON has pioneered the way, has led in research, development and construction. Starting with the Everson Re-Circulating System of continuous water purification, Everson products and activities in this field have grown till this company now supplies either complete swimming pools or any part thereof.

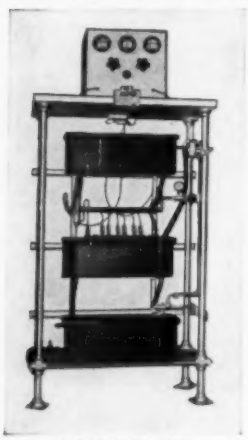


A TYPICAL EVERSON SAFETY POOL

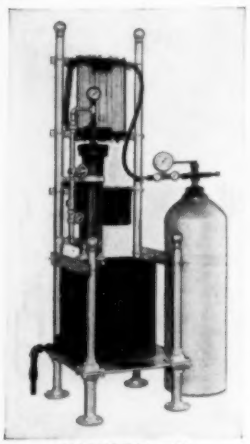


AN OUTDOOR EVERSON SAFETY POOL

Everson Chlorinators



"MODEL E"
Everson Safety Electro Chemical Chlorinator
Produces sodium hypochlorite electrically from ordinary brine solution.



"MODEL G"
Everson Gas Solution Vacuum Feed Chlorinator
Provides for controlled use of stored chlorine gas —economical, efficient.

Also

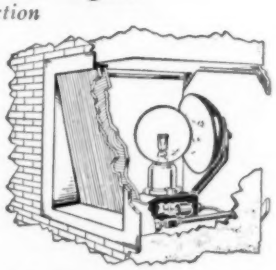
"MODEL H"—Everson Chemical Solution Feed Chlorinators
Produce chlorine solution from prepared chemicals.

Everson Chlorinators are substantial, dependable, efficient, and prices range from $175. They are available in capacities and types for all swimming pools, and have the flexibility and control required for general water purification use. The "Model E" Safety Electric Chlorinator is recommended for all types of indoor swimming pools and small-capacity outdoor swimming pools, where operation with high pressure gas tanks is hazardous. The "Model G" Gas Solution Vacuum Feed Chlorinator is suitable for all outdoor swimming pools, especially for large capacity. The "Model H" Chemical Solution Feed Chlorinator is developed for a low-priced installation.

Everson Underwater Lights

Beautify, Aid Instruction

Developed by Everson, these lights stop all glare, evenly illuminate every corner of the pool. Each detail of form and movement of swimmers is easily seen and many modern, staging effects are made possible.



Other Everson Equipment

- Filters
- Sterilizers
- Pumps and Motors
- Heaters
- Vacuum Cleaners
- Hair and Lint Catchers
- Built-in and Portable Suction Pool Cleaners
- Corametal (non-tarnishing) Pool Fittings
- Ladders and Springboards

Write for Free Bulletins

Informative bulletins covering all phases of pool design, construction and maintenance will be sent free, upon request. Write to Everson Filter Co., 627 W. Lake Street, Chicago, U. S. A.

EVERSON SAFETY SWIMMING POOLS

THE AMERICAN SCHOOL AND UNIVERSITY

THE EVERWEAR MFG. CO.

35-65 S. Sycamore Street
SPRINGFIELD, OHIO

PLAYGROUND EverWear APPARATUS

BEACH AND POOL EQUIPMENT

AT last, A Safe Swing Seat! EverWear Scores Again—For Safety! No longer can a swing seat seriously or fatally injure any child, if the seat is the new EverWear Patented No. SR-206 Spring-Rubber Safety Seat.

Made of soft, resilient rubber, strongly interiorally reenforced to withstand vertical loads in excess of 1000 pounds, but will flex edgeways: adding to its safety. Every contact surface is springy, cushiony rubber. Both top and bottom surfaces of the seat are non-slip and can be regularly used without detachment from the suspensions: the clevises are reversible.

The new EverWear No. SR-206 Spring-Rubber Safety Seat for Swings is higher in price, but one accident, one doctor bill, or one funeral expense SAVED, and you are more than satisfied with your investment. INVESTIGATE THEM!

EVERWEAR PLAYGROUND APPARATUS, Beach and Pool Equipment has always been known for its proven safety and durability. The line includes all standard outfits, as well as many which are exclusively EverWear. A careful investigation of our products is invited. Write for Catalog.

Patented, heavy, one piece malleable iron, galvanized, double compression toothed "dogs" frame fittings are easily the safest obtainable. Patented, positive lubrication, twin race, ball bearing hanger clamps remove the last hazard from these necessary parts of swings and other suspended units.

Whatever you want, we believe a superior outfit is found in the EverWear line.

RE-EQUIP FOR SAFETY!

EVERWEAR SPRING-RUBBER SAFETY SEAT FOR SWINGS

Patented. Other Patents Pending

The World's Oldest and Largest Exclusive Maker of Playground Apparatus

GENERAL ELECTRIC COMPANY

General Office: Schenectady, New York

SALES OFFICES IN PRINCIPAL CITIES

FLOODLIGHTING AND ELECTRICAL SCORE BOARDS

This Light Started Sports at Night

In the fall of 1923, Tufts College played the General Electric engineers on the Lynn Athletic Field by the light from the G.E. Novalux floodlighting projectors—the first football game at night.

Since then, General Electric floodlighting has popularized outdoor sports at night. Under it, football, soccer, baseball, tennis, golf and hockey have been played successfully. Colleges, prep schools, high schools and civic bodies have adopted it for their fields. G.E. floodlights can be used throughout the year for lighting of different athletic fields, pageants, college buildings, and parking areas. Both open and closed types are available.

Since the schedule of classes often prevents hockey and football practice before 5 o'clock in the afternoon, floodlights can be used practically every night.

Swimming pools can be lighted at a reasonable cost with a small specially designed underwater floodlight.

Tennis courts may be illuminated adequately by the use of either the open or closed types of floodlight.

What are some of the advantages of floodlighting? Here is an example of what the athletic manager of Temple University in Philadelphia thinks of it. "Since Temple put on night football, the student attendance has jumped 33⅓ per cent. Sixty per cent of our student enrollment of 13,000 work in the afternoon, and were unable to see the afternoon contests. Night football was virtually demanded by the students."

HOCKEY COURT FLOODLIGHTED

This opinion of the athletic manager partly explains why over 125 football fields have been permanently lighted by General Electric since 1930. Other reasons were the big increase in gate receipts, the minimized interference with classroom duties and, of course, perfect illumination.

So when you plan to floodlight your field, pool, hockey rink, tennis courts, or any other athletic activity, have a G.E. lighting specialist look it over. He will give you complete information and recommendations from the famous General Electric Illuminating Engineering Laboratory—gladly and without obligation. You can get in touch with him through the nearest G.E. Sales Office.

Electrical Score Boards

Electrical score boards can be furnished for use in various kinds of athletic events such as baseball, basketball, football, etc. The complete equipment consists essentially of a small control, or operator's, board provided with a number of buttons marked for various indications and a large steel indicating board on which numerals appear outlined by lamps.

The score posting on the large board can be changed instantly by pressing the proper buttons on the control board. The equipment is simple in design and easy to operate, and the indications are easy to read at a distance. For complete information refer to our nearest office; ask for Bulletin GEA-1302.

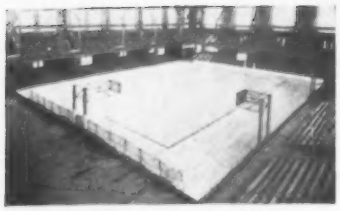
HUNTINGTON LABORATORIES, INC.

Toronto, 72 Duchess St. Denver, 999 So. Logan St.

Main Office and Factory: Huntington, Indiana

SEAL-O-SAN

FOR WOOD FLOORS



University of Wisconsin

100% NON SLIPPERY

SEAL-O-SAN is a scientific floor treatment which gives wood floors a positively non-slippery surface. At the same time, it brings out the beauty of the wood, seals it against dirt or moisture and prolongs its life.

SEAL-O-SAN is ideal for gymnasium floors, class rooms, hallways and for all wood floors. It makes a better looking floor, *yet it costs much less than most floor treatments because no skilled labor is required.* Seal-O-San is applied with an ordinary lamb's wool mop, or kalsomine brush, and your regular employees can do all of the work. It is as easy to apply Seal-O-San as it is to scrub the floor—but the results last for months longer.

SEAL-O-SAN also *decreases maintenance costs.* Scrubbing is entirely eliminated and the only maintenance required is occasional mopping with a dustless mop.

SEAL-O-SAN *may be applied to new floors or old.* It gives old floors new life, restores the original lustre and color and natural grain of the wood.

Indiana State Tournament—Butler U.

OVER 3000 SCHOOLS USE SEAL-O-SAN

Union H. S., Phoenix, Ariz.
High S., Little Rock, Ark.
Union H. S. and Junior College, Tafts, Calif.
H. S., St. Louis Park, Minn.
University of Colorado
Iowa State University, Iowa City, Iowa
University of Indiana
Notre Dame University
Purdue University
Butler University
University of Chicago
University of Illinois
University of Kentucky
University of Maryland
University of Michigan
University of Montana
University of Missouri
University of Nevada, Reno
Miami Univ., Oxford, Ohio
University of Pittsburgh
Vanderbilt University
William & Mary College
University of Wisconsin
Normal U., Chadron, Nebr.
Southwestern Louisiana College, Hammond, La.
U. S. Coast Guard Academy, New London, Conn.
Rutgers University, New Brunswick, N. J.

TRADE MARK
HUNTINGTON LABORATORIES

Duke University, North Carolina

IMPROVES THE GAME

A FLOOR that is 100% non-slippery is obviously a better floor for basket ball or any gymnastic activity. A player may race toward a basket, receive a pass, stop still and shoot, without danger of slipping, skidding or falling. Seal-O-San prevents accidents and helps the coach keep a full squad—and play better games. It has been demonstrated that any good coach with a good team can turn out a better brand of basket ball on a good floor. Even attendance is better because Seal-O-San makes the gym more attractive. There is no glare to confuse the players. *Write for book on Seal-O-San.*

Our Floor Maintenance Laboratory will help you maintain your floors economically. We manufacture preparations for all types of floors and for all cleaning and sanitary needs. *Tell us your problems* and we will gladly help you.

We also manufacture Derma-San, the double strength disinfectant which helps you combat the infection popularly known as "Athlete's foot", in showers, lockers and pool. *Write today for samples.*

Deseret Gym, Salt Lake City, Utah

THE MATHIESON ALKALI WORKS (INC.)

60 East 42nd Street, New York, N. Y.

PLANTS

Niagara Falls, N. Y., Saltville, Va., and Lake Charles, La.

BRANCH OFFICES

Widener Bldg., Philadelphia, Pa.
Straus Bldg., Chicago, Ill.
Hospital Trust Bldg., Providence, R. I.
First National Bank Bldg., Charlotte, N. C.
Dixie Terminal Bldg., Cincinnati, Ohio

PRODUCTS

H T H (Concentrated hypochlorite)
H T H-15 (Germicide)
Liquid Chlorine
Anhydrous Ammonia
Aqua Ammonia, 26°
PH-Plus (For water treatment)
MaFoS (Dishwashing cleanser)

H T H

For a wide variety of sanitary purposes, particularly around the swimming pool and gymnasium, H T H is the most convenient and reliable source of available chlorine. It is more than twice as concentrated as chlorinated lime, and retains its full strength even at summer temperatures.

H T H is a dry, free-flowing powder, readily soluble in cold water. Each 4-lb. can contains 2½ lbs. of available chlorine. It is most conveniently purchased in case units of 12 cans each.

FOR SWIMMING POOLS

At thousands of swimming pools throughout the country, H T H is used both in the pool water and for general sanitation of surroundings. A "6-point Sanitation Routine" which provides germicidal and fungicidal protection is easy to follow with this concentrated hypochlorite. (Write us for complete directions.)

For pool water purification, H T H can be added direct to the pool in powder form, or fed in solution form with simple, inexpensive equipment. A supply of H T H is kept on hand at many pools where liquid chlorine is used for regular treatment. If trouble occurs with pumps or chlorinating equipment, H T H guarantees safety in the emergency.

TO PREVENT ATHLETE'S FOOT

Locker rooms, shower rooms, toilets, pool runways, etc., are undoubtedly among the worst offenders in the spread of Athlete's Foot and similar ring-worm infections. Sprinkling H T H daily on damp floors will prevent them from becoming transfer points for these organisms.

Effective foot bath solutions are made from H T H. One ounce to each gallon of water gives the concentration recommended by health authorities (5,000 p.p.m.). Many States now require such foot baths at public pools.

STERILIZING AND BLEACHING

School laundries, following the practice of commercial laundries throughout the country, find that H T H solutions are uniform and economical for bleaching and sterilizing of towels, gymnasium uniforms and other white goods, and as a sterilizing rinse for cotton bathing suits.

OTHER MATHIESON PRODUCTS

H T H-15—This chlorine germicide yields sodium hypochlorite solutions, balanced to avoid corrosion of metal equipment, when added directly to water. It is the ideal germicide and deodorant for use in school kitchens, dormitories, and for camps and hiking trips.

PH-Plus—A fused alkali manufactured especially for restoring to swimming pool water the natural alkalinity it loses in use and during filtration.

MaFoS—A new type of cleanser for dishwashing machines which comes in the form of dense, water-free briquets. Tests prove it more efficient and economical than powdered cleansers.

SWIMMING POOL AT PUBLIC SCHOOL NO. 12, TROY, N. Y., WHERE H T H IS USED TO PROTECT AGAINST ATHLETE'S FOOT

METAL OFFICE FURNITURE COMPANY

Grand Rapids, Michigan

STEELCASE
Business Equipment

Manufacturers of

TERRELL STEEL LOCKERS

Acetylene Welded Frame Corners

Rust-Proof Bolts

Improved Handle Concealed Padlock-Eye

No Weld Marks

Adjustable Floor Shoes

Doors Have Channel Edges

Concealed Hinge Pins

New Locking Mechanism

Rubber Cushion Door Silencers

Tamper-Proof Latching Device

MORE THAN HALF A MILLION TERRELL LOCKERS IN USE

TERRELL LOCKERS, made in a complete range of sizes and styles, meet every requirement of the school or gymnasium. Any grouping of full height or double tier lockers and box lockers can be supplied. Quality and satisfaction are fully guaranteed.

Silenced operation, a new latching mechanism, a new type of handle with concealed and tamper-proof padlock-eye—these are only a few of the features which make Terrell Lockers outstanding.

Write for complete information. **See Page 273 for other products.**

MITCHELL MANUFACTURING COMPANY

Makers of

"Betterbilt" Playground Apparatus

MILWAUKEE, WIS.

The need of proper recreation facilities in our school and municipal playgrounds grows greater with every passing year. More recreation centers must be prepared for both children and adults, and existing playgrounds must be renovated and re-equipped.

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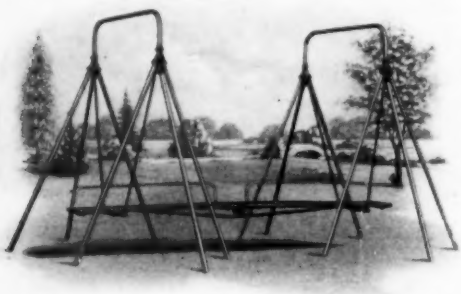

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The FOLD-O-LEG TABLE here illustrated is valuable equipment for schools, cafeterias, parks and recreation centers. It is set up or folded in a moment, easily carried in one hand, unusually strong and rigid when set up, and requiring surprisingly little space when stored. **Write for illustrated circular.**

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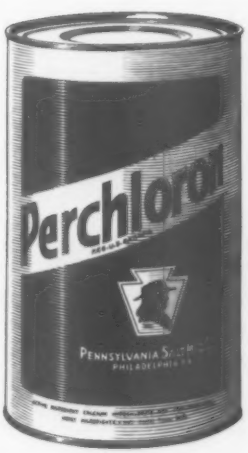

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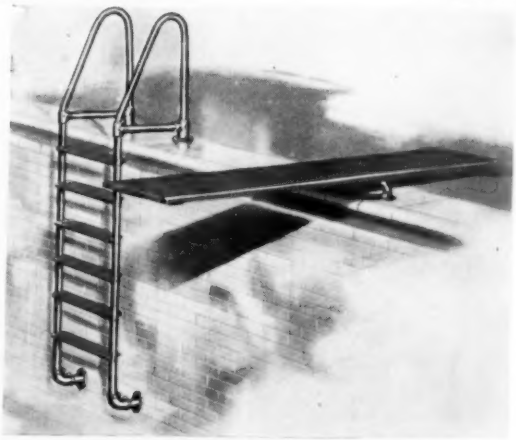
We shall be happy to confer with you, not only in the selection of equipment, but also in the planning and preparation of your playground areas and athletic fields—a service of our Playground Engineering Department which is at your command without cost or obligation. Would you like to know more about the Junglegym and the Buddy-Duplex Swing, the two ingenious devices illustrated below? Or about the "Hoist-a-way" Basket Ball Backstop, which folds away when not in use, so that an auditorium can be used as a gym, and vice versa? May we tell you about the Louden Remotomatic Electric Basketball Scoreboard? Or would you like us to send you a copy of the complete Louden catalog? We believe you will find much of value in this catalog, to help you in working out your recreation problem, whatever it is.



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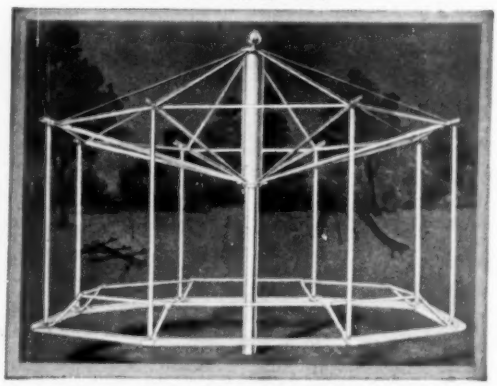

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JUNGLEGYM—for climbing

BUDDY-DUPLEX—for swinging

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For cleaning white tile, terrazzo, marble, porcelain, etc.; also for cleaning brass and bronze.

ERUSTICATOR—Rust stain remover; absolutely safe for all kinds of fabrics and colors.

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A good tile cleaner must employ both chemical and abrasive action. An abrasive harsh enough to remove embedded dirt and stains would wear down the tile. The abrasive must be so fine and soft that it will remove surface dirt and ordinary stains but will in no way mar the polish or luster of the tile. The chemical cleansing also must be accomplished safely.

Harmful Acids

Muriatic Acid is sometimes used for cleaning when tile becomes badly stained or discolored. But the fact that it is used to remove surplus cement from newly laid tile proves that muriatic acid is a dangerous cleaner for tile; it will gradually eat away the cement grouting from between the tiles. Tile cleaners containing this acid should be avoided.

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The chemical ingredients of **TILITE** give it maximum cleansing and stain-removing power with absolute safety to the tile and the cement. The abrasive in **TILITE** is so soft and smooth that, in a whiter form, it is used as the base for a tooth-paste. **TILITE** is exceptionally effective for removing iron rust stains, discolorations, waxy dirt, soapy deposits, embedded dirt, oil and grease stains, etc., leaving the tile glisteningly clean and polished.

Free sample and prices will be sent on request.

Some **TILITE Users** — Naval Training Sta., Newport, R. I.; Lafayette College, Easton, Pa.; Lehigh Univ., Bethlehem, Pa.; Dartmouth College, Hanover, N. H.; University of Virginia, Charlottesville, Va.; Gustavus Adolphus College, St. Peter, Minn.; Washburn College, Topeka, Kan.; Detroit Athletic Club, Detroit, Mich.; Numerous Y.M.C.A.'s and Boys' Clubs.

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With the school swimming pool firmly established as a part of the physical training program, efficient sterilization is necessarily important. School executives can do no better than to follow advice given in the Report of the Joint Committee of the American Public Health Association and the Conference of State Sanitary Engineers. This report, in part, states: "From all available information, the addition of chlorine either as a gas or water solution by use of proper apparatus is today the most satisfactory method of pool disinfection." Chlorine alone gives the residual penetrating action for the complete protection of bathers at every point in the pool. More than 3000 swimming pools of the United States today rely on W&T chlorinators for positive disinfection.

"SWIM IN DRINKING WATER"

W&T Type MSP Chlorinator—For the majority of medium-sized pools, this type machine is most suitable. It not only accurately controls the small amounts of chlorine but gives a feed range sufficiently wide to include all changes in bathing loads. All control parts are on the outside and a removal hood makes complete inspection possible at any time. Its simple construction and operation are readily understood by the practical pool attendant.

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W&T Ammoniator—Used with a W&T chlorinator for the production of chloramine. Chloramine is the most advanced method of pool sterilization. High chlorine residuals can be carried without objectionable tastes or odors. Chloramine rids filters and pool water of algæ growths—a real saving in operating costs. Savings of as much as $200 a season have resulted from the use of chloramine. W&T Ammoniators are made by the same rigid production standards and excellence of material as W&T chlorinators. W&T Ammoniators differ only in the special materials required for the efficient metering of ammonia.

W&T AMMONIATOR USED WITH A W&T CHLORINATOR TO PRODUCE CHLORAMINE

W&T Chlorine Comparator—Swimming pool chlorination can only be controlled accurately, economically and safely when regular use of the orthotolidin test is made. The W&T Hellige Chlorine Comparator meets all requirements for a rugged, portable, accurate testing outfit. Its operation is so simple that accurate determinations of residual chlorine require only a moment's time and no specialized knowledge.

At Your Service—We are prepared to study any problems covering the sterilization of swimming pools and a nation-wide service organization is responsible for satisfactory performance of W&T equipment.

Current literature on the sanitation of swimming pools is available on request.

Section VI

CLASSROOM—AUDITORIUM—LIBRARY —COMMERCIAL DEPARTMENT

Trends in Classroom Design and Equipment

BY N. L. ENGELHARDT

PROFESSOR OF EDUCATION, TEACHERS COLLEGE, COLUMBIA UNIVERSITY

SAMUEL F. EVELETH, architect, of New York City, issued in 1870 a volume on schoolhouse architecture in which he presented seventeen designs for schoolhouses, and layouts of classrooms. Some of the classrooms are rectangular in shape and others are octagonal. The only evidence presented in this volume that instructional needs were given consideration in the planning of rooms is one instance in which the spacing of the seats for the 56 pupils of one of the classrooms is specifically given. The arrangement of these seats has very little reference to the natural lighting of this classroom and apparently has been based upon the principle that a desk must be furnished each child in a classroom but that desk must be securely fastened at a certain point on the floor so that the location of that child may be fixed in the mind of the teacher. Outside of this one indication that any thought has been given to the child in the arrangement of the room, this volume contains no other evidence that the needs of the child, or the needs of the teacher, have played any part in the development of the plans presented.

Over the decades since Eveleth's volume was produced, progress was made only gradually and slowly in the planning of classrooms to meet the specific needs of the instructional plans which were being followed. Even today, many classrooms are being planned where the only criteria used in guiding the planner are the number of square feet per pupil, or the minimum number of cubic feet allowed under state regulation. Here and there, however, one finds the pioneer superintendent and architect who are thinking in terms of better adaptation of classroom space to the needs of the educational program and therefore are planning buildings which promise to provide better opportunities for carrying out the educational program.

For many years the kindergarten space was the only room planned in the elementary school in which careful attention was given to the kind of educational work being done and to the needs of pupils and teacher. When the kindergarten was introduced, there was no hampering traditional plan of pre-arranged seats, and hence apparently freedom was accorded the planners. It is probably for this reason that the kindergarten has become the most livable and most attractive room in elementary schools. Its fireplace, its cozy seats and nooks, the aquarium, the window-bays, the storage places for the educational materials, the recreational apparatus, and the accessory spaces for cloaks, lavatories and toilets are features which are frequently incorporated in these rooms, their installation having been dictated by the educational need.

What has been done for the kindergarten should be done for every type of classroom in all public school planning. The kindergarten teacher has been given the opportunity of incorporating her special needs in the building plan. There is no reason why this group alone should be singled out for this privilege.

The Rooms of the Elementary School

With changing curricula and changing methods of teaching, it is imperative that greater consideration be given the planning of all rooms of the elementary school. Teachers in one school system, when asked to plan a first-grade room, divided the room into two parts—free space for music, story-telling, talking pictures, games and dramatics, and a workroom in which there were hot and cold water, work-benches, electric plugs, bulletin boards, and storage cabinets for children's work materials. Associated with this room were also the cloakrooms, the toy storage, lavatories for boys and for girls, and the storage room for the workroom materials. Such space provisions for the first grade will make possible the development of a complete activity program and the liberation of the teacher and pupil from many of the harassments of the classroom lined only with black chalkboards.

A group of third-grade teachers in a school system in which an advanced curriculum program was being promulgated, when asked to outline their idea of a desirable classroom for their groups, planned an elementary classroom 25 feet wide and 50 feet long. Again the room was divided into two major parts with a 34-foot section equipped with chalkboards, cork boards, display cabinets, cupboards, talking-picture equipment, teachers' wardrobe, library alcove, bookcases, alcove seats, and individual cupboards for 40 pupils. The auxiliary space was devoted to a

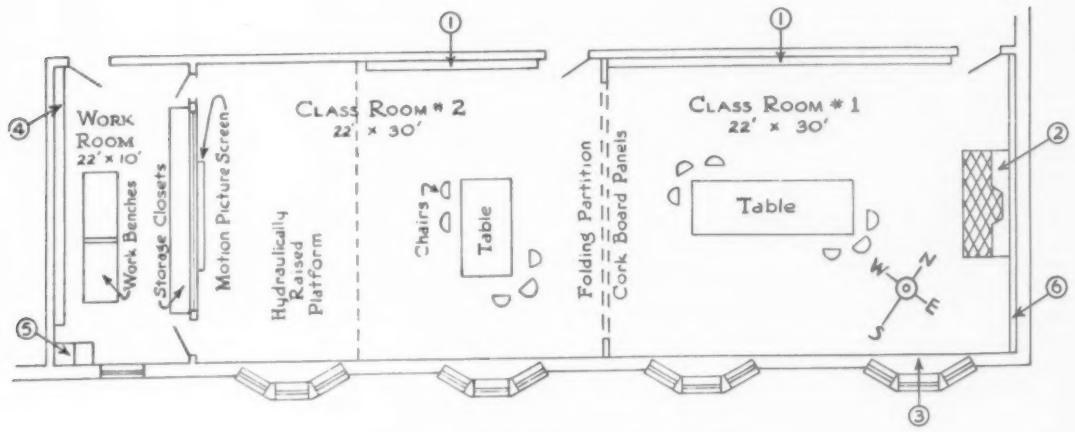


DIAGRAM I. TWO CLASSROOMS AND A WORKROOM

1—Disappearing blackboards. 2—Fireplace. 3—Radiator below window-seat. 4—Storage rack. 5—Sink. 6—Removable panels for murals

workroom in which there were cabinets and storage room for work materials, a paint bench, a work-bench, a sink with drain-boards at proper heights for children, and an 8-foot work space in which the noisy work of the classroom might be carried on. Another subsidiary section of the space was devoted to cloakroom and other storage space.

The plans of the teachers in these grades do not differ greatly from the plans that might be proposed for any of the elementary grades by groups of teachers who are progressively minded and who have taken a highly professional attitude toward curriculum development. Dr. Frank M. Long[1] in his volume, "Desirable Physical Facilities for an Activity Program," suggests changes and additions to be made to elementary classrooms for the kindergarten and grades 1 to 6, as a result of his review of the needs outlined by many teachers. For classrooms, Dr. Long suggests:

1. Increase in length of about one-fourth or one-fifth to give enough space for the activity program.
2. Separate alcove for construction work, or for group and committee work.
3. Wardrobes built into wall, with folding doors to provide increased floor area.
4. Running water, both hot and cold, in every room.
5. Drinking fountain in every room.
6. Toilet facilities in connection with every room.
7. Storage facilities.
   a. Individual compartments, large enough to be useful, for each child.
   b. Distribution of these compartments to relieve congestion.
   c. Provision for storing large materials and supplies.
   d. Increased provision for storing general materials.
   e. Provision for storing blocks and toys in the primary grades.
   f. General storage room on each floor.
8. More bulletin board space.
9. Less blackboard space.
10. Bulletin boards and blackboards placed at a lower level in all the grades.
11. Outside door for each room on the first floor.
12. More special equipment—display space for books and magazines, construction equipment, screens, easels, sewing machine, cooking equipment, aquaria, window-boxes, ferneries, sand table, provisions for pets, housekeeping materials, rugs; and especially for the kindergarten—fireplace, bay-window, window-seats, provision for floating toys and sailing boats, blocks, and a terrace.
13. Better facilities for taking care of children's wraps.

(Pages 73 and 74 in "Desirable Physical Facilities for an Activity Program.")

High School Classrooms

There is great promise that the elementary school in the near future will have incorporated in its plans the kinds of provisions that are outlined above. The classrooms of the junior and senior high school have, unfortunately, been given less attention than have those of the elementary school. Progress in the adaptation of high school classrooms to teacher and pupil needs has been relatively slow. The chances are that most of the classrooms that are being incorporated in high school plans of today have had almost no attention given to the adjustment of the space to the particular needs of instruction. In one of my graduate classes during the summer of 1934, I asked groups of students to give consideration to this problem. There was unanimity of opinion that greater attention should be given to the adjustment of room spaces to the rapidly growing curriculum changes in these schools. One group of principals presented to the class a proposal for a senior high school social science suite. This suite consisted of three rooms, as shown in Dia-

[1] Published by the Bureau of Publications, Teachers College, Columbia University, 1933.

gram 1,[1]—two classrooms and a workroom. One classroom was devoted to history and geography, and one to physics and economics. The workroom was planned for the preparation of exhibits and other instructional materials, and for the storage of work materials. Reference to the diagram will show the following features:

Sound-resisting folding partitions between rooms 1 and 2, which makes possible a room 22 feet by 60 feet for visual instruction and dramatizations for larger than single class groups.

The sound-resisting material of the upper portion of the folding partition to consist of colored cork to match the woodwork, to be mounted flush with the surface of the partition and on either side of it, and to serve as bulletin boards.

The west end section of room 2 to be mounted on a hydraulic hoist to lift the floor to a maximum of 18 inches and to serve as a stage.

A glass panel 2 feet in height, the bottom of which would be 4 feet from the floor, to be placed in the partition between rooms 2 and 3, and extending from door to door, the glass to be of two thicknesses separated by a dead air space to lessen noise.

A large projection screen to be attached to the wall above the glass panel mentioned above and to be in room 2. A good projector and portable daylight moving picture machine should be included in the equipment.

Double roller translucent shades to be attached to the middle of all window frames. Overdrapes of golden-brown velvet, to pull on a track, to provide beauty and light resistance.

In corridor walls of rooms 2 and 3, provision for closets, bookcases, cupboards, drawers, and space for disappearing blackboards.

Provision for a genuine old-fashioned fireplace at the rear of room 1, with large removal murals (to be made by art department) on either side and over it. Similar provision for murals to be made over glass panel in front of room 2.

Workroom to have shelving and storage cupboard space; also to be equipped with workbenches, tools, gas, electricity and water. To be used for making exhibits for such projects as court sessions, traffic problems, and other relevant subjects.

Furniture to be of early American type with pine finish and of living room and library type. One piece in either room to conceal a radio.

Bay-windows, small clear glass, wide trim in pine finish. Wide window-sills with top grating to conceal radiators or uni-vent, with built-in window benches in front.

Floor covering to be a battleship linoleum representing wide pine board floor. Rag throw rugs to be used, also hook rugs made by the pupils, with appropriate designs.

Walls to be of white plaster to be painted later with light cream or yellow.

Light fixtures also of the electric candle chandelier type, controlled by an electric eye.

[1] Plan developed by W. L. Lowe, Supervising Principal, Cazenovia, N. Y., H. Z. Wooden, Principal of the Ann J. Kellogg School at Battle Creek, Mich., and A. B. Wrigley, Principal of the Boys' Vocational and Continuation School at Elizabeth, N. J.

It is also proposed that the movable mural panels be developed—

To portray the political, industrial, social, educational, religious, commercial, scientific, and cultural development of the race, and especially in America. Under the above there would be many subtitles, each of which would require from one to several murals.

Owing to the overlapping of subjects and projects, a single mural might be used as a part of several different themes if properly prepared. This overlapping is well illustrated in what might be used to show the development of education and its contribution to American society. Murals might be used to portray the winning of religious freedom, freedom of the press, freedom of speech, democratic form of government, universal suffrage, progress of science, art, music, literature, means of communication, business, industry, commerce, medicine, and law.

In laying out these proposals the committee was instructed to overlook for the time being the question of cost and merely to project that which seemed to be essential for social science purposes. It is clear that there can be many intermediate steps between the various kinds of rooms that are provided for social science and this proposed ideal layout. It should also be clear to superintendent and architect that the social science group can no longer be content with bare four walls and no adjustment of space to meet the many needs of the modern program of instruction in this field.

A Modern-Language Unit

Another committee of this same graduate group undertook to suggest layouts for a modern-language unit. They also divided this unit into three rooms—two classrooms and a work and study room. As shown in Diagram 2,[2] a corner of the building was chosen as the desired location for this layout. The workroom also became the stage of one of the classrooms, so that when the folding doors were opened, French plays, recitations, or similar types of classroom activity could be conducted within the classroom unit. The walls of the classrooms were planned to have decorations in keeping with the language taught. The pictures, draperies, and other decorations of the classrooms and workroom, it was proposed, should be in keeping with the environment of the language taught. A French unit might well be developed to reproduce a section of France, a German classroom to be in harmony with a Bavarian or Rhineland atmosphere, and a Spanish or Italian classroom to reproduce the characteristics of those lands. Room B in this plan also becomes the off-stage dressing room at times when performances are being given. In these rooms was to be found informal furniture which

[2] Plan developed by L. C. Hunt, Superintendent of Schools, Burlington, Vt., W. J. Mellor, Superintendent of Schools, Texola, Okla., V. H. Volgamore, Superintendent of Schools, Boone, Colo., and O. S. Weaver, Supervising Principal of Schools in Des Moines, Iowa.

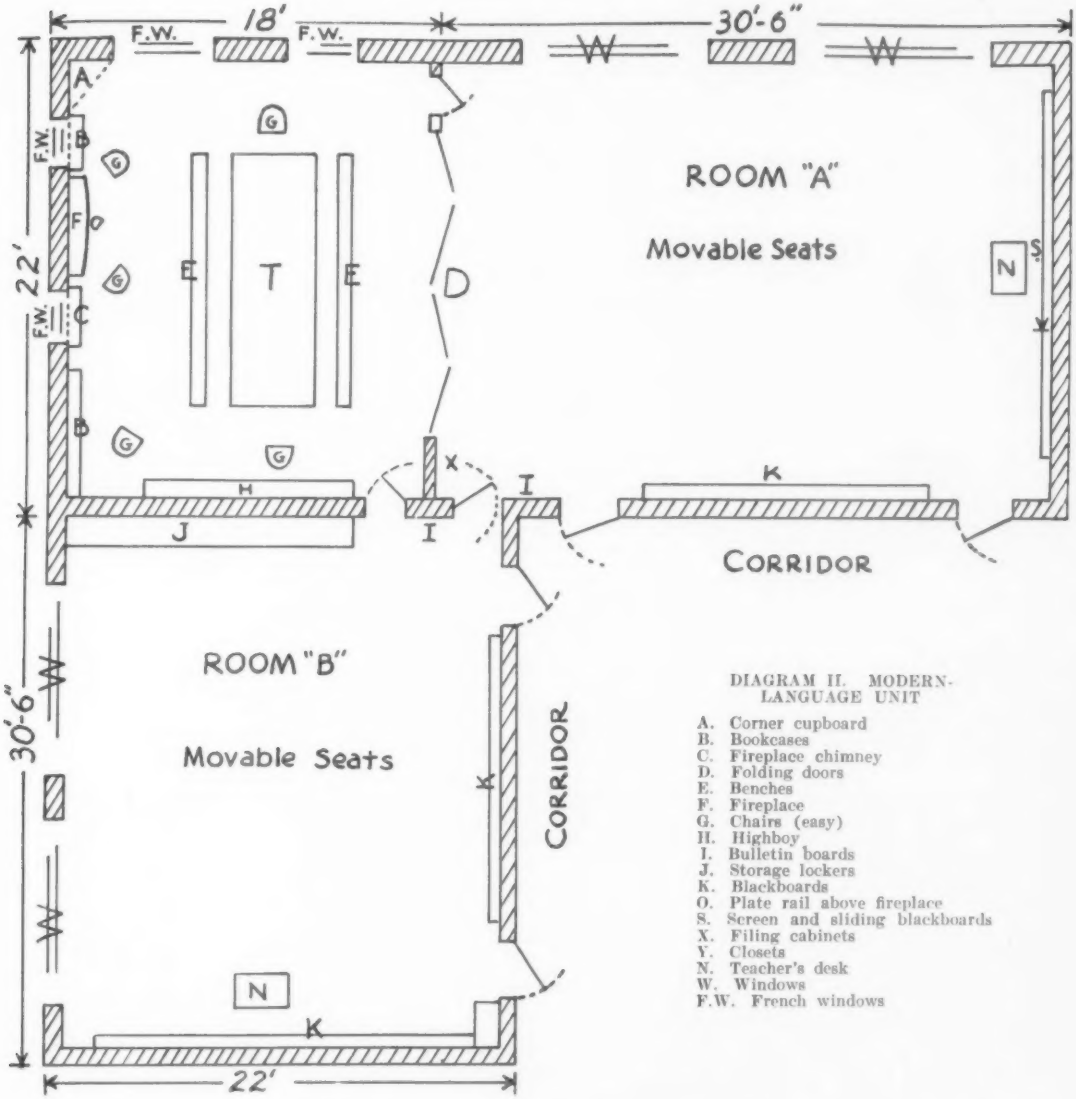


DIAGRAM II. MODERN-LANGUAGE UNIT

A. Corner cupboard
B. Bookcases
C. Fireplace chimney
D. Folding doors
E. Benches
F. Fireplace
G. Chairs (easy)
H. Highboy
I. Bulletin boards
J. Storage lockers
K. Blackboards
O. Plate rail above fireplace
S. Screen and sliding blackboards
X. Filing cabinets
Y. Closets
N. Teacher's desk
W. Windows
F.W. French windows

might be grouped around the fireplace, or special conference tables. A homelike atmosphere was desired. Equipment for the reproduction of the language on the talking-picture screen, or through the phonograph record, were included. The rooms produced by this group of workers are indicative of what results are secured when any group of progressive students of education are given the opportunity of analyzing their building-space needs and the equipment which is essential for the adequate promotion of their work.

For the subjects which have been of more recent introduction into courses of study in junior and senior high schools, greater elasticity in the design and equipment of rooms has been possible than in the traditional fields of history, English, language, mathematics, and the like. The near future should see very significant changes, because the traditional subjects are also undergoing rapid alteration. The few schools in which the English room has been developed as an Elizabethan theater, the Latin room as a Roman Forum, or the history room as a museum, have set a standard which school planners should plan to attain in future developments.

The changes which have taken place in class size because of superior professional knowledge of how to teach larger groups, the introduction of the radio and the talking picture as helpful media, are forces which in a measure will also dictate changes in school-building planning and in the size and character of the educational spaces.

The Planning and Equipping of Nursery Schools

BY GEORGE D. STODDARD

DIRECTOR, IOWA CHILD WELFARE RESEARCH STATION, UNIVERSITY OF IOWA

REPORTS from the White House Conference on Child Health and Protection* indicated that in 1930 there were less than 500 nursery schools in the United States. Also, it is clear from the special report referred to and from other sources that little attention had as yet been paid to the planning and equipping of nursery schools. For the most part they were located in university and teacher training centers. These institutions had utilized buildings originally erected for other purposes, and in some cases had remodeled and redecorated private dwellings to meet the needs of very young children. As a result of this rather haphazard development of physical plant, one finds practically no nursery school units worth citing as examples of an appropriate union of structure and function.

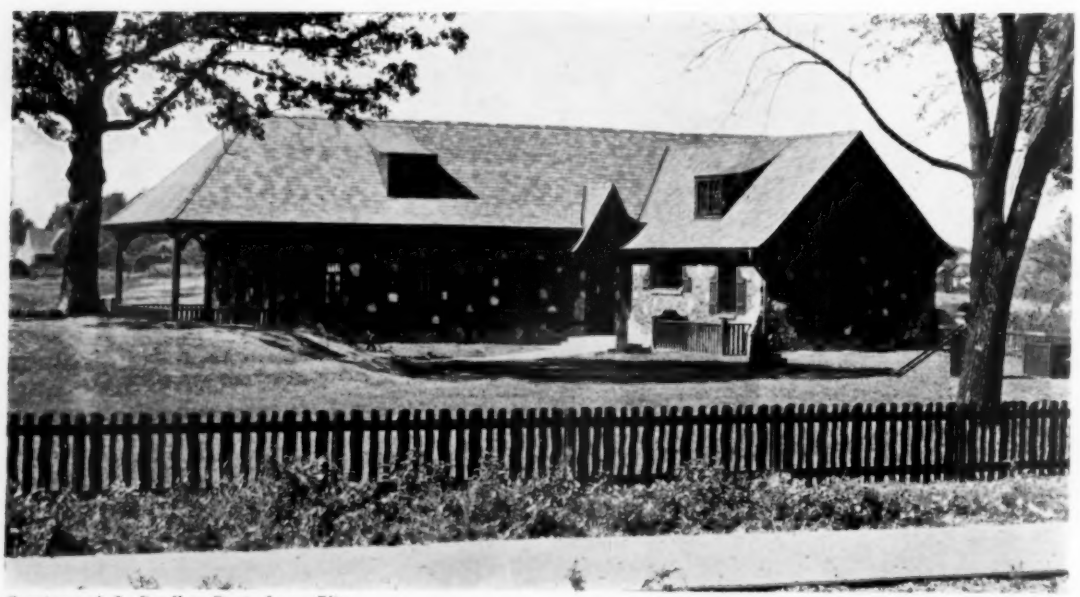
Opportunities Offered by the Nursery School

In view of the relative newness of the movement and its present rapid spread through the sponsorship of emergency educational projects in the Office of Education and the Federal Emergency Relief Administration (2,300 emergency nursery school units were established in the spring of 1934), it may be well to ask exactly what place in education the nursery school is expected to fill. The present writer has recently summed up its contributions.† Briefly, for children from two to five years of age the nursery school is held to afford these unique opportunities:

1. It offers superior play facilities both as to equipment and child associates.
2. It assists in forming good habits.
3. It simplifies the rendering of health and nutritional services.
4. It offers excellent provisions for social development.
5. It assists in preventing and eliminating behavior maladjustments.
6. It introduces at an appropriate age esthetic stimulations and opportunities.
7. It offers an advancing program which can be made to articulate smoothly with kindergarten and first grade.
8. Its experiences tend to transfer to the home, thus improving family life.
9. It offers an excellent opportunity for the guidance and education of parents.
10. It frees the mother for part of the day, restoring to her leisure time not gained through child neglect.

* White House Conference on Child Health and Protection: "Nursery Education—A Survey of Day Nurseries, Nursery Schools, Private Kindergartens in the United States." Report of the Committee on the Infant and Preschool Child, John E. Anderson, Chairman. The Century Co., New York [c. 1931]. xxi, 187 pp.

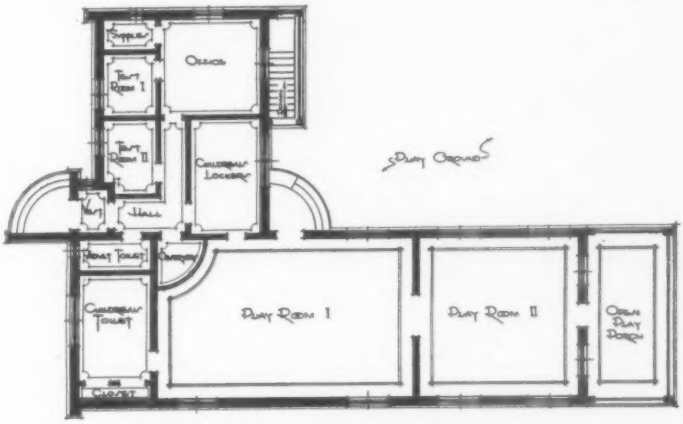
† George D. Stoddard: "More Aid for the Very Young." *New York Times*, July 15, 1934.



Courtesy of J. Bradley Rust, Iowa City

EXPERIMENTAL PRESCHOOL UNIT AT THE IOWA SOLDIERS' ORPHANS' HOME, DAVENPORT, IOWA

It is clear that certain of these opportunities are rather closely related to the excellence of the physical plant and equipment. One of the great defects in the design of the average home lies in the inadequacy of free space and play facilities, both indoors and out, for the younger children. Nor does the average schoolroom offer what is needed for such children. What may be relatively easy "discipline" for older children becomes a positive cruelty for young children whose energies, play and social interests demand freedom of movement, spontaneity, noise, and muscle-using equipment. Moreover, the full day nursery school makes certain demands upon health, food and sleep arrangements not found in the ordinary school day.



FLOOR PLAN OF EXPERIMENTAL PRESCHOOL UNIT AT DAVENPORT

Essentials of the Nursery School Plant

Probably there would be a rather general agreement upon the essentials of a nursery school plant expressed in functional terms, although certainly not upon the exact way in which these essentials can be met. In the latter sense there is of course no one best school plant, for much variation is to be expected (and encouraged) in terms of local needs and interests. However, these things should be provided for in one way or another:

1. A building free from fire hazard
2. A building which provides easy access to the outdoors
3. Playrooms with a large amount of free space
4. Good lighting, whether natural or artificial, or a combination of the two
5. Toilet arrangements suitable for young children
6. Well-ventilated sleeping accommodations
7. Sanitary and efficient kitchen
8. Heating and ventilation adjusted to proper conditions near the floor
9. Floor and wall surfaces suitable for young children
10. Outdoor smooth runways or platforms for wheeled toys
11. Outdoor grassy surfaces for free play
12. Auxiliary rooms for head teacher, nurse's inspection, medical and other examinations
13. If nursery school is to be used for teacher training or other observational purposes or for parent education, special arrangements for such observations (e. g., a space enclosed with a one-way vision screen)
14. Furniture adapted to children as to size, strength and type
15. Appropriate assortment of toys, games, materials, blocks, pictures, books, etc., for indoor use of children
16. Outdoor apparatus and equipment such as sand-box, jungle gym, platforms, packing boxes, vehicles, digging tools, wading pool, etc., appropriate to the preschool age
17. Outdoor protection (e.g., by a fence) against running away and traffic dangers
18. In general, an informal, natural atmosphere, permitting a wide variety of physical, mental, esthetic and social activity on the part of each child, similar to that found in enlightened homes and differing notably from the situations in the typical elementary school classroom

Of course, no one nursery school has as yet been built to embody all these recommendations in the fullest sense. In the emergency nursery school situation it was recognized that only an approximation of such standards could be reached, and suggestions were simplified accordingly. They have been presented in concrete form for the practical guidance of school administrators in Bulletin No. 2, "Housing and Equipment," of the National Advisory Committee on Emergency Nursery Schools (obtainable from the United States Office of Education). This bulletin furnishes equipment lists for groups of twenty-five and fifty children, together with working drawings for a large amount of school equipment. An earlier bulletin entitled "Preschool Equipment," giving drawings, pictures and descriptions of fifty-four pieces of apparatus, furniture and equipment utilized at the Iowa Child Welfare Research Station, is available from the Extension Division of the University of Iowa, Iowa City, Iowa.

A Concrete Example

Recently an attempt has been made to incorporate many of the ideas listed above into an experimental nursery school being erected at the Iowa Soldiers' Orphans' Home under the supervision of the Iowa Child Welfare Research Station. The elevation of this preschool unit is shown on page 218, and its floor plan above. In this unit special attention is called to the following points:

NURSERY SCHOOL PLAYROOM IN AN ELEMENTARY SCHOOL BUILDING

1. The exterior design fits in with the other buildings on the institution's campus.

2. The building provides for the separation of children. For example, in addition to ample outdoor play space there are two large indoor playrooms, together with a covered porch.

3. The design makes it easy to give the children a nurse's inspection on entrance.

4. There is a special provision for staff or student observation in the northeast corner of the large playroom.

5. There are adequate provisions for testing and examining the children without interfering with the general program of the group.

6. The building is bright and gay, close to the ground, and decorated in a manner pleasing to children.

7. The floor is covered with linoleum; walls are of pale-green glazed brick; a built-in balcony with stairs, swings and ladder occupies the west wall space of the larger playroom.

8. The outdoor equipment includes a large sand-box, slide, trapezes, wading pool, concrete platform and runway, packing boxes, vehicles, etc.

Examples of preschool units in remodeled schoolrooms may be expected to multiply through the impetus of emergency educational projects. It is the simplest way to establish an emergency nursery school, but it may not be the best way. Had elementary school buildings been originally designed with the idea of extending educational facilities on a full day basis to children as young as two years, this statement might not have been correct. Increasingly we may expect large-scale planning at the elementary level to include special suites, or better yet a wing or a dwelling especially designed for these children. Illustrations of the utilization of a rather conventional room in a school and in a frame dwelling are presented, not as models, but rather as typical of what may be found over the country.

Available Bulletins

Architects and school planners interested in current developments in this field in other countries would be much interested in two bulletins which have recently appeared. "Die Kindergarten der Stadt Wien," by Philipp Frankowski and Rose Liederer, describes new kindergarten plans in Vienna and prints nineteen photographs of the new plant. Since children are admitted from three to six years of age, this institution comes within the American nursery school classification. An English translation of this bulletin is also available, but without illustrations. It is entitled "The Vienna Municipal Kindergartens." Similarly, "Protection of Motherhood and Childhood in the Soviet Union," by E. Conus (State Medical Editorship, Moscow, 1933—English translation by Vera Fediaevsky), describes various preschool institutions as they are developing in Russia. It includes pictures of plant and equipment, together with a few floor plans. In England the slum clearance authorities have taken whole-heartedly to the nursery school idea and are producing effective and pleasing arrangements for education at this level. Information concerning these developments can be obtained from London municipal officers, or from the United States Office of Education, Washington, D. C.

In this country an analogous development, per-

Photographs by courtesy of Iowa Child Welfare Research Station

NURSERY SCHOOL PLAYROOM IN A REMODELED PRIVATE DWELLING

haps on a smaller scale, may be expected to come about through certain Federal reconstruction programs. Authority for the inclusion of nursery schools where appropriate has been granted by Harry L. Hopkins in memorandum E-26, Federal Emergency Relief Administration, May 24, 1934:

> "Upon the request of the appropriate authorities, and consistent with the provisions outlined in this memorandum, emergency nursery schools may be established and financed in subsistence homesteads or as part of the arrangements for Indians, migrant workers, rural rehabilitation, stranded populations or unemployed women."

Apparently the American nursery school has come to stay. It follows that educational planners and administrators will need to become familiar with the philosophy and aims of this movement in order that children below the customary school age, if admitted in large numbers to our educational systems, may not suffer from the hazards and deficiencies which characterized so many of our earlier school buildings. Nor will a thorough familiarity with the needs of older children be suitable as a basis for designing these new units. Rather, the approach must be fresh and open-minded, even though the final results constitute a radical departure from conventional school design.

Looking Ahead in Radio

BY ARMSTRONG PERRY

THE use of radio receivers in schools and colleges is well established. Progressive educators do not permit their hold on their pupils to be weakened by allowing the motion picture theater, the barber shop and the pool-room to be a generation ahead of the school in the matter of equipment. The desire to be in touch with all that is going on in the world is so strong in American youth that it will be satisfied elsewhere if the school cannot satisfy it.

The modern radio receiver has eliminated most of the inconvenience that was experienced with earlier equipment. It is no longer necessary to clamber over roofs to erect antenna masts, although adventurous youths still enjoy such work. A plug in a light socket, with the addition, perhaps, of a short length of wire strung in any convenient way, places the radio receiver in operating condition. The finding of the desired station requires only the turn of a single dial, and the volume is easily controlled by another.

A well-equipped school has a good receiver in the principal's office connected by wire circuits with loudspeakers in the classrooms. This enables the principal to make sure that the pupils receive the best music and addresses instead of other things that might be selected accidentally from the varied programs offered by the broadcasting companies and the advertisers. Usually the principal has a microphone also through which he may address any classroom or all of them at once. In some schools a two-way system, like a telephone circuit, enables the principal to listen in his office to what is going on in the classrooms, but that is somewhat less popular with teachers and pupils for obvious reasons.

Improvements Coming

Radio engineers prophesy that, within the next few years, much broadcasting will be done on ultra-high frequencies (very short waves) and that the radio channels now used for broadcasting may be abandoned to other services. If this happens, local school officials may be able to maintain local broadcasting systems entirely under their own control.

Experimentation indicates that the ultra-high frequencies have an effective range of only a few miles. They are not considered useful for long-distance broadcasting, but will cover the area of a large city. In addition, they are comparatively free from some types of interference which trouble many stations and listeners, and they permit a higher degree of fidelity in the transmission and reception of speech and music than is usual in broadcasting at the present time.

Engineers say that transmitting stations using ultra-high frequencies can be erected at comparatively small expense, that individual receivers could be produced for as little as $2 each, and that receivers suitable for classroom use might cost no more than $20 each. The very short waves have somewhat the same characteristics as light waves, and the antenna needs to be within sight of all the buildings in which the programs are to be received. Such a school radio station would not interfere with any other broadcasting service.

It would be possible for a school broadcasting station of this kind to pick up with a good receiver programs broadcast by other stations, such as grand opera and symphony, and send them to the schools on wave-lengths which would reach the school receivers.

Television

Television appears to be waiting only for economic conditions to become adjusted. From the point of view of the Federal Government, it is still in the experimental stage. Advertising by means of television is not permitted yet and, the American system of broadcasting being dependent almost entirely on advertising for its income, station owners see no way to make profits from television. Progressive educators are

looking forward, however, to the possibility of adding television to the other means of visual instruction. Television receivers are still comparatively expensive, but by the time programs become available generally, they will probably be as easy to install and operate as ordinary receivers in use today.

Listening to Foreign Countries

Between the frequencies now used for broadcasting and the ultra-high frequencies of the future are frequencies used effectively for world-wide broadcasting. With receivers that can be purchased in any radio store it is possible to hear short-wave stations in all parts of the world. There are adapters, too, that can be used for receiving short waves on ordinary receivers. More careful tuning may be required than is necessary for bringing in local stations, but any one, with patience, can bring in programs from London, Berlin, Madrid, Rome, Moscow and even the Orient and Australasia.

Without casting reflections on modern-language teachers in American classrooms it can be said that listening directly to a German, a Frenchman, an Italian or a South American speaking in his own country and in the language thereof has a greater thrill for many an American student than listening to a teacher in his own school. It stimulates interest in geography and history because of the natural desire to find out where the speaker is and what part his country plays in the affairs of the world.

Radio Takes Educators to the Public

The modesty of educators keeps some at the receiving end of radio who ought to be making themselves heard by the general public through the broadcasting stations. The time will come when the taxpayers, already keenly aware of the expense of public education, will find out that educators supported by public funds could just as well serve the entire community daily in addition to the comparatively small number in the classrooms. A few forward-looking educators are studying microphone technique, and several colleges are giving courses in broadcasting.

Even the most commercially-minded broadcaster welcomes an interesting program provided by a school. Broadcasting stations seldom are able to sell more than one-third of the time which they must fill. The other two-thirds must be filled, and programs cost money. Even phonograph records wear out, and this is true also of the listeners' patience. There must be endless variety if the station is to maintain an audience which it can sell to advertisers. Educational programs can be made as interesting as the cheap vaudeville and jazz which have filled so many broadcasting hours. Educators learn to produce interesting programs, when they apply themselves to the task with the same determination that they expect in their pupils.

Microphones are installed in school buildings through which programs produced there go through broadcasting stations to the public. It is probable that many a school that has suffered from a reduced budget will some day maintain its income, or even increase it, by keeping in daily touch with the taxpayers by means of radio.

Before the programs prepared in school go on the air, it is desirable to send them through a microphone to a loudspeaker in the school and have them criticized by a competent committee. If the school is not radio-equipped, there are inexpensive microphone-loudspeaker outfits on the market. A phonograph that makes records as well as reproducing them will answer the same purpose, and also enable speakers and musicians to hear themselves. Few persons recognize their own voices when they hear them for the first time, but they usually notice defects and discover possible improvements.

Self-Education Through Radio

A few schools and colleges have discovered the value of amateur radio. It is such a fascinating hobby that most of the radio engineers of today educated themselves by reading and experimentation before they studied radio in school, and built and operated transmitting and receiving equipment by the time they were fifteen years old. Many a boy of that age is communicating directly with others in many parts of his own country, and some reach as many as fifty foreign countries.

A number of the most important scientific expeditions to remote places have been kept in touch with civilization by radio amateurs still in their 'teens. Amateurs have rendered distinguished service when commercial communication systems were disrupted during cyclones and earthquakes.

By international law certain radio channels are reserved for the use of amateurs, who use them for experimentation in the transmission of Morse-code messages, voice and music. Amateur radio stations in schools and colleges have been found helpful in teaching physics, and their activities stimulate interest in other studies. What boy or girl does not want a foreign correspondent?

A dollar amateurs' handbook, secured from the American Radio Relay League, West Hartford, Conn., will start a group of boys in the radio game, which has 45,000 devotees in the United States. The ingenuity shown in securing materials and building apparatus is almost beyond the belief of a teacher who has encountered the usual difficulties in teaching less interesting subjects. A "ham" station requires little space. Government regulations, which must be observed, ensure safety.

Radio Literature Expanding

The first book on education by radio appeared in 1929. Within five years the literature of the subject filled extensive biobliographies, which can be secured from the following:

United States Office of Education, Washington, D. C.
Bureau of Educational Research, Ohio State University, Columbus, Ohio.
National Committee on Education by Radio, 1201 Sixteenth Street, N. W., Washington, D. C.
National Advisory Council on Radio in Education, 60 East 42nd Street, New York.
National Association of Broadcasters, National Press Building, Washington, D. C.

The Goal

Business men and politicians appreciate the value of the opportunity for reaching half the population of our country and audiences in other countries daily by means of radio. When educators come to place as high a value on this opportunity, there will be some re-allocating of the ten billion dollars invested in American school and college buildings and equipment and of the three-billion-dollar annual budget of education. One to two per cent of these amounts would give education an adequate share in the control of this powerful instrument.

Business men are not leaving the education of American youth to the home, the school and the church. They are using the press, the motion picture, the billboard and the radio for forming tastes and habits.

The educator who uses only classrooms, lectures and books may one day reach a point at which, like a certain captain in a comedy, he will look up and exclaim: "There go my men; I am their leader; I must follow!" Any one who will look back a generation or two will realize that the control of children has passed out of the hands of parents and teachers, to a great extent, and is in the hands of commercial groups using modern methods. This control should be recaptured.

As a goal for radio the following might be suggested: (1) the equipment of every school with receiving sets, at least; and (2) a control of the broadcasting system which will guarantee that anything received through the public radio channels will be as trustworthy as anything taught in school or college, more interesting than amusement, and definitely helpful in raising the standards of American life.

SCHOOL LIBRARIES

Because the daily use of library materials is indispensable to the modern American program of elementary and secondary education, every child should have access within his school to a variety of well-chosen books and other printed materials. This means that larger schools, both elementary and secondary, should be provided with organized libraries presided over by professionally prepared personnel, and that smaller schools should be provided with books and organized library service through participation in some plan of large-unit administration. In order to bring these conditions about, those responsible for the administration and financing of both schools and public libraries should come together locally and as state and regional groups to work out programs giving to schools adequate school library service and facilities without unnecessary duplication of physical equipment, reading materials, or personnel, and without curtailment of reading opportunities for adults. It will also be necessary for boards of education to budget school libraries and library service on the same basis as they are accustomed to budget other educational indispensables such as textbooks and teaching service, and to arrange for the certification and employment of school library personnel on a professional basis.

—From "Notes for a National Plan for Libraries," prepared by a Planning Committee of the American Library Association, for consideration at the 1934 conference.

Light—The Connecting Link Between the Eye and Education

BY HENRY B. DATES

PROFESSOR OF ELECTRICAL ENGINEERING, CASE SCHOOL OF APPLIED SCIENCE; CHAIRMAN, COMMITTEE ON INDUSTRIAL AND SCHOOL LIGHTING, ILLUMINATING ENGINEERING SOCIETY

THE extent of defective vision of school children and its notable increase as children progress through the grades are focusing attention on the lighting of school buildings.

Long-continued, close visual application has come about in relatively recent times. The eye evolved under the high values of outdoor daytime illumination. The levels of illumination which prevail in our schools average less than one-half of one per cent of the light provided out of doors during daytime working hours. There are many classrooms in which the average illumination is so low that the eyes are required to operate at what might be termed "threshold" values of seeing.

Measuring Schoolroom Illumination

Some idea of the prevalence of gloom in schoolrooms may be had by visualizing a room dark except for the light from candles placed one on each side of the child's desk. This may be thought to be an overdrawn picture, but the eyes are easily deceived in their attempt to measure illumination. In judging the light in a room, attention is instinctively drawn to the windows, and their brightness creates the illusion of a sufficiency of light. As a matter of fact, the illumination next to the windows may be more than 100 foot-candles and, at the same time, the illumination on the desks farthest away from them be only 2 or 3 foot-candles. Merely looking at a room is quite the wrong way to pass judgment on the lighting. Only by making measurements with a light meter or similar instrument can true values of the amount and the distribution of the light be determined.

THIS SIGHT-SAVING CLASSROOM HAS A WHITE CEILING, LIGHT-COLORED WALLS, AND GOOD PROVISION FOR THE CONTROL OF NATURAL LIGHT

The nine 750-watt lamps in mirrored glass luminaires spaced 10 feet apart provide 35 foot-candles on the desks and 14 on the blackboards

DAYLIGHT LAMPS ARE USED IN THE 1,000-WATT SIZE IN THIS SIGHT-SAVING ROOM

The units are aluminum (indirect type) and provide 35 foot-candles on the desks, 15 on the blackboards

The visual operation called seeing is a partnership of two essential factors, vision and lighting. The principal control over vision is the application of lenses. Many school systems provide for a periodic examination of pupils' eyes, and advising parents when the child needs glasses. This is a great step in the right direction.

The other partner in seeing is lighting. In effect, school lighting is much like street lighting: the community suffers for not providing adequate light. It has been repeatedly demonstrated that many pupils, considered backward, were merely struggling under the handicap of not seeing well, and the direct result of this preventable

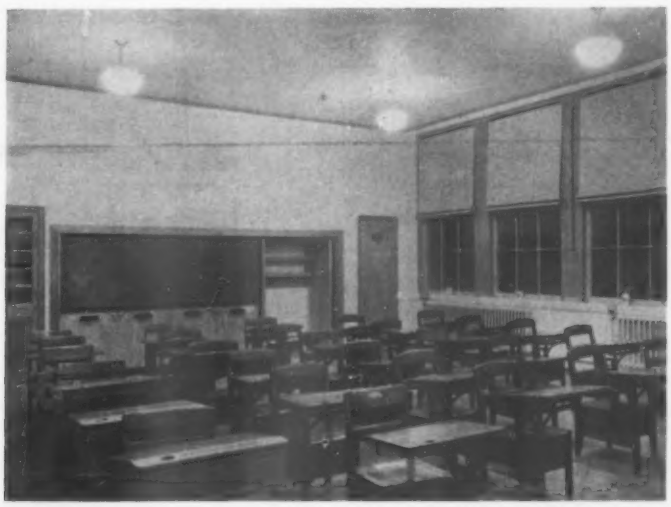
backwardness is an economic waste through the loss of pupils' time in repeating courses, and the additional expense to the school system. When poor lighting is responsible for preventing pupils from passing examinations, the cost to the school system may easily be as much as the school lighting bill for the entire year.

Good Schoolroom Lighting Pays for Itself

An excellent illustration of the economic value of good lighting is found in a study, extending over three years, of the progress of children in two sixth grade rooms in Tuscumbia, Ala. The children were divided into two groups of similar I.Q., and one room was re-

A HIGH SCHOOL LIBRARY

Size 34 x 22 feet; 12-foot ceiling. Six 200-watt lamps, spaced 11 feet 4 inches by 11 feet. Illumination on table tops, 14 foot-candles



AT LEFT, A CLASSROOM

Six 200-watt lamps, in enclosing diffusing globes (direct lighting) spaced on 11-foot centers, provide 14-foot candles on the desks and 10 foot-candles on the blackboards

THE I.E.S. STUDY AND READING LAMP (BELOW) IS ONE TYPE OF DESK LIGHT WHICH MAY BE UTILIZED FOR LIBRARY READING ROOMS

The lamps are fitted with white glass open bowls; the inner surface of the shades is painted white

lighted to modern standards. Two 150-watt lamps in direct enclosing fixtures were in room "A," and four 300-watt lamps in indirect units were installed in room "B." The lights in room "B" were on photocell and time control, so that the number of hours use could be recorded, and a minimum of 12 foot-candles was always present on the row of desks farthest from the windows. At the close of the test, it was found that the automatically controlled lights in room "B" burned an average of 35 per cent of the time, against 12 per cent in room "A" on manual control. Electric light in room "B" was therefore used only 23 per cent more of the total time. Despite this relatively small addition, there was

a marked effect on the number of failures during three years. The number of failures in room "A" was nine per year and in room "B" only three. The cost of additional lighting for room "B" was $25 per year. The cost of educating each pupil in this school, for actual operating expenses, was $28. On that basis, lighting paid for itself more than six times over.

The teachers testified that "the children in room 'B' were more alert, cheerful, and attentive, while those in room 'A' seemed restless and sleepy on dark days and were harder to teach."* A well-lighted room brings alertness and cheerfulness, cleanliness, and orderliness. Discipline is easier to maintain because everything in the room is clearly in view. In night-school classes, where most of the students have already performed a day's task, there is special value in the stimulus that good lighting gives to morale and efficiency.

In this connection it may be pointed out that schools are being used more and more during night hours. Hence, the lighting equipment should be originally designed to furnish adequate illumination without the help of natural daylight. This is particularly true in libraries and study rooms, and in classrooms used for commercial and art courses.

Best Lighting Practice for Sight-Saving Classes

More than 400 sight-saving classes were functioning last year in the United States, and a total of 5,000 children have been segregated for special visual attention in them. Illustrations accompanying this article indicate the accepted best practice in lighting rooms of this and similar types of interiors. Full advantage is taken of natural daylight. The upper walls are painted in light colors and the ceiling is flat white. The window-shades are mounted in the center; two are provided for each window. The luminaires are of the indirect type which insures practically glareless illumination. The fixtures are spaced symmetrically in the rooms, which guarantees uniform light at all desks. The lamps generally used are 1,000-watt, and the illumination on the desk tops totals 30 foot-candles or better. The blackboards have substantially uniform light from top to bottom, the average being about 14 foot-candles. Individual blackboard fixtures have been used successfully. One system specially designed for the purpose consists of a row of boxes in each of which two 150-watt lamps are placed. The cover glasses are prismatic, thus regulating the beam distribution.

"Standards of School Lighting," published by the Illuminating Engineering Society, contains information on "Lighting and Vision," "What Constitutes Good Lighting," "Natural Lighting of School-rooms," and "Artificial Lighting." These Standards of School Lighting have been approved by the American Standards Association and the American Institute of Architects.

Lighting School Libraries

The libraries of schools have three distinct illumination problems:

1. General lighting
2. Local lighting for reading tables
3. Lighting for book-stacks

When separate buildings are devoted to library work, the main reading rooms are often monumental in character and large in area, and have high ceilings. For general lighting, the tendency too frequently is to provide architecturally styled fixtures with individual candle-shaped units, perhaps with frosted lamps. More satisfactory results can be obtained from large decorative globes or open bowl units with 500 to 1,000 watts capacity, allowing not more than 15-foot spacing. Such single lamp fixtures need not be less correct in style and may provide twice as much light for the same current expenditure.

The I. E. S. study and reading lamp, illustrated, is representative of a good type of table unit. Such units, fitted with 100-watt lamps, and spaced 4 feet apart, will provide excellent reading light free from glare. Special trough units running the length of study tables have been used successfully. These utilize inner reflectors and diffusing glass sheets, providing uniform light downward over the table surface.

With increasing enrolments and reduced personnel, the school administrator has found new problems confronting him in the use of the available room space. Given larger classes per instructor, the supervisory task becomes more difficult than ever before. In a visual sense, high-level lighting brings the students in the back of the room in closer view and thus makes easier the work of supervising study in general assemblies and in crowded rooms.

The immediate benefits which proper school lighting affords the pupil and instructor, important as they undoubtedly are, are overshadowed by the ultimate benefit of conserving vision. Eye strain and eye fatigue due to inadequate or glaring lighting results in abuse of the eyes, and such abuse causes irritability, nervousness, dizziness, and headache. Since children's eye muscles are in a relatively plastic state, the effect of dazzling lights or gloomy surroundings is manifestly more serious than the same conditions would be for adults.

Good lighting makes for ease of seeing and materially contributes to the conservation of eyesight and the prevention of impairment of vision.

* Transactions of the Illuminating Engineering Society, Vol. XXVIII, page 866.

School Library Planning and Equipment

BY LUCILE F. FARGO

RESEARCH ASSOCIATE, SCHOOL OF LIBRARY SERVICE, COLUMBIA UNIVERSITY

THE school library plan should have a functional basis. Long before the architect goes to work, the principal and the librarian should have had their heads together to produce a statement covering the essentials of the proposed school library plant in terms of its functions. Briefly, these functions are as follows:

To provide adequate and convenient housing for books and other graphic materials valuable in carrying out the educational and leisure-time program of the school.

To provide for the comfort and convenience of individual readers while using library materials.

To provide reasonable opportunities for group work involving the use of library materials.

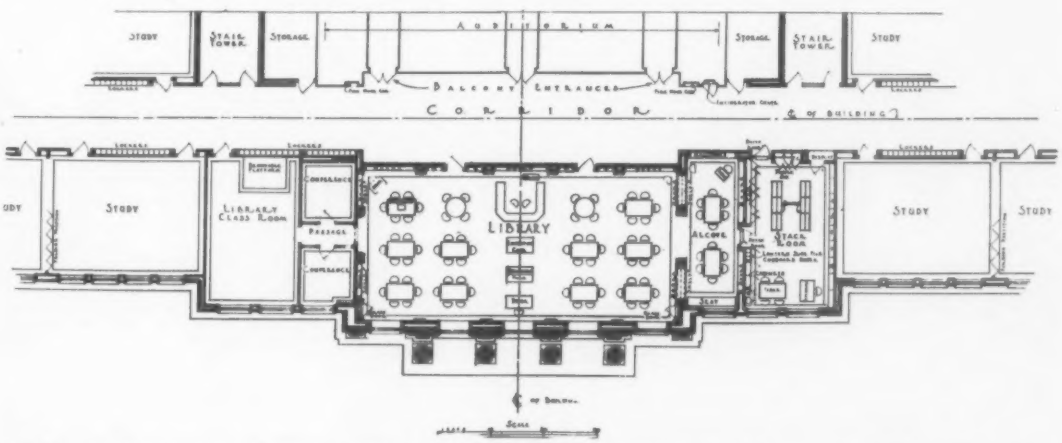
To furnish facilities for the necessary technical work of the library staff and for housing records.

Housing for Books and Other Graphic Materials

The first step in providing adequate housing for books is to estimate the probable size of the book collection and then figure shelf capacity at the rate of eight volumes per running foot. The size of the book collection has been estimated all the way from two to six or more volumes per pupil enrolled, the larger figures applying to smaller schools. But even such figures are doubtful guides because they are conditioned by the presence or absence of nearby public libraries, classroom library facilities, and other factors. Probably the best the school can do is to use all available wall space for shelving, and plan for growth through the introduction of floor cases or added rooms.

Books may be said to be conveniently housed when they are readily accessible and easily kept in order. This means that shelving is not to be higher than the reach of the average person using it, and not deeper than is necessary to accommodate the general run of books when standing on end. The most economical use of space is had when shelves are adjustable; so the librarian estimates 10 inches in the clear between shelves as a safe average, adds 4 to 6 inches for the base and another 2 inches for the top, plus 13/16 to 7/8 of an inch for the thickness of each shelf, and then determines how high the average boy or girl in the elementary or the high school can reach. Shelving thus figured will run in the elementary school to 5 or 6 feet in height, and in the secondary school to a maximum of 7 feet; (6 feet 10 inches is standard for sectional or "unit" cases). Furthermore, since experience has shown that a depth of 8 inches is sufficient for the great majority of books, most shelving is thus built, but there are added a few sections of deeper shelving (10 to 12 inches) for oversize volumes such as the picture books used in the lower elementary grades and occasional volumes of other sorts in the secondary school.

Among the requisites for keeping books in order, one has been mentioned: shelves not over 8 inches in depth which provide against books slipping back and so getting lost. Another requisite is that spacing between uprights should be reasonably short in order that the shelves may not sag and cause books to fall in upon each other. A 3-foot shelf of good material will not thus sag, and the 3-foot shelf has consequently become the standard, with the advantage of the interchangeability of such standard shelves from one case to another.



VERY COMPLETE HIGH SCHOOL LIBRARY SUITE, PIERRE S. DUPONT HIGH SCHOOL, WILMINGTON, DEL.
The alcove with its window-seat and magazine shelves is inviting. Dutch doors in the combined workroom and stack-room expedite the issuance of reserves or other items housed there

One more thing should be said about shelving. Book storage, except perhaps for vacation periods, is not one of the important functions of the school library. Volumes that do not prove their usefulness by being in demand should pretty generally be relegated to the stacks of larger and more scholarly libraries. If the school librarian is responsible for the administration of free textbooks, these again should be relegated to stacks outside the library proper, though perhaps connected with it. On the other hand, the bona fide library collection, with the exception of a limited group of reserves, should be displayed as far as possible on open shelves about the walls of the main reading room, and not housed in a closed-off stack or high on a balcony.

The windows of the school library may be placed high—frequently above the bookcases—and it is good planning to arrange for plumbing and heating through pipes and vents located behind the cases. Thus every advantage is taken of opportunities for having books close at hand, cosy and inviting. Only under unusual circumstances, as in case of a very large school, or a renovated schoolroom serving as library, is there need for a stackroom; and even then most schools find it desirable to make the room easily accessible through an open archway or, if more supervision is essential, by way of an entrance close to the librarian's desk.

Since the up-and-coming school library acquires and dispenses many graphic materials other than books—pamphlets and clippings, pictures, maps, charts, and sometimes slides, victrola records and films—special provision has to be made for the storage of these items. A legal-size vertical file with ball-bearing slides is usually recommended for the clippings and pictures, and any reputable library equipment house will provide specially designed cases or racks for the other materials. Given a librarian who is handy with figures and a sketching pencil, or who knows where to look for designs in the literature of librarianship, such special features can often be manufactured locally, sometimes by the school's manual training department.

Provision for Individual Readers in the Library

It is the function of the library to bring persons and books together. The next thing is therefore to make provision for the library clientele. That usually means chairs and tables; it may mean window-seats, settles, benches (these for the little folks), and occasional individual table desks. Here there is not much that is fixed and standard except the width of the tables, which should seldom be less than 3 feet. Provided each reader has table space amounting to approximately 360 square inches and elbow room of from 26 to 30 inches (26 is the minimum for the elementary library), tables may be round, oval or rectangular in shape, and may vary in height from 26 to 30 inches (26 inches for the little folks in the elementary school), so long as they are sturdily built and can be arranged to good advantage in the reading room. To get at the necessary floor space for tables and other equipment, it is customary to estimate 25 square feet per reader. This will allow for generous aisles of approximately 5 feet, and

A SCHOOL LIBRARY THAT IS DIFFERENT BECAUSE OF ITS SPACIOUSNESS, HIGH WINDOWS, AND RAFTERED CEILING

space enough between tables and shelves to avoid congestion. Undesirable qualities in tables are sharp edges, crossbars near the floor (pupils scrape their feet on them), poorly seasoned wood which warps, a high polish which causes eye strain or one that is not easily cleaned. Long tables are not very desirable, because they tend to formalize a room and are more difficult to supervise.

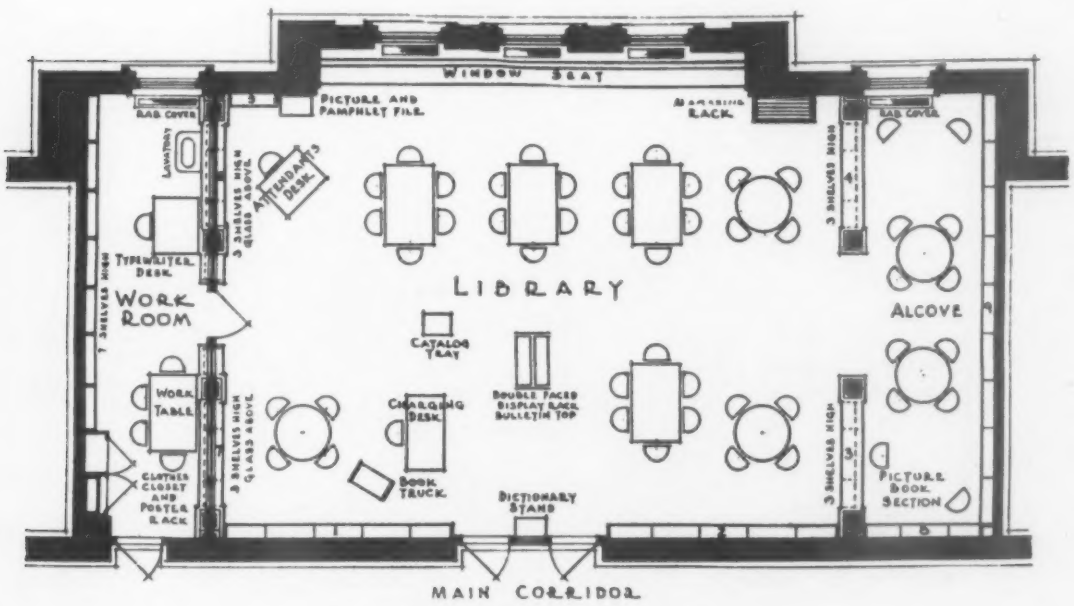
Chairs are necessarily conditioned by tables. Heights vary according to table heights and the stature of the users. The appended tabulation of measurements should afford some aid. It is important to remember that in common with all school library furniture, chairs should always be stoutly constructed, but they should not be too heavy to move. Also, it is obvious that if floor space is at a premium, chairs with spreading arms and legs (Windsor armchairs) are not economical for table use, though they may be desirable scattered about the room in convenient nooks or corners or near a fireplace. Boys and girls, like grown-ups, appreciate an inviting chair in which to sit and read quite apart from desk or table. And it is one of the outstanding tactics of the school library to make reading desirable by making it informal and comfortable in the matter of furnishings.

This matter of quiet comfort for the individual reader leads easily to two other matters—a noiseless floor covering, and adequate lighting. Moving about is as legitimate in the school library as in any other type. But it should go on without being a source of discomfort or distraction to others. Hence the popularity of battleship linoleum, linotyle and other like floor coverings.

As for the lighting, the scientific formulas evolved by illuminating engineers may be followed, provided that artificial light is indirect. Table lights are not desirable in the busy school library. They interfere with the mobility of furniture and offer too many temptations to mischief-loving fingers. Windows should of course be plentiful, and preferably not all on one side as in the conventional schoolroom with little depth. If the ceiling is high enough, they may for the most part be placed above book cases, though a few low ones with seats or counters beneath add charm.

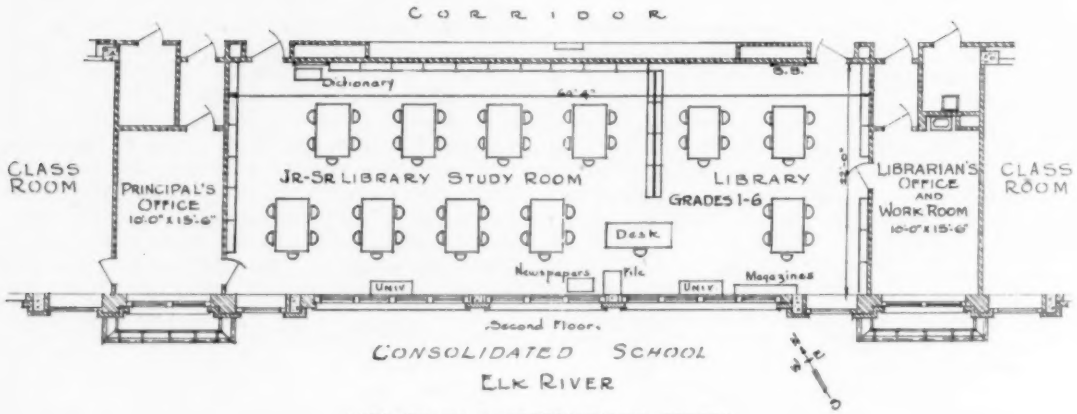
Opportunities for Group Work

So far we have spoken only of readers as individuals. But the modern school believes in socialized activity. Special opportunities for group work should therefore be provided for in the library plant—especially in the large school. This usually means planning a series of small rooms, each just large enough to accommodate wall shelving and still house comfortably a 3 x 5-foot table and four to six chairs. The partitions between these conference rooms and the main reading room should be of glass, to assure easy supervision. If space is available, it may be desirable to build one room rather larger and equip it for faculty use. It may also be possible to arrange for a movable partition between two of the conference rooms, thus providing for a classroom when the librarian has occasion to conduct a library lesson. Or a separate classroom may be added to the suite and equipped with a projector which can be used to display pictures in books, postcards,



AN ELEMENTARY SCHOOL LIBRARY

This very complete library in the David W. Harlan School, Wilmington, Del., is really one room subdivided by low cases three shelves high with a glazed partition above at one end. The two doors provide for incoming and outgoing groups



LIBRARY IN A CONSOLIDATED SCHOOL

This library serves all grades. Note separate entrances for lower and upper school pupils, the partition provided by free standing book shelves, the placement of the librarian's desk to supervise both groups

slides, and all the other visual materials now with growing frequency housed in libraries.

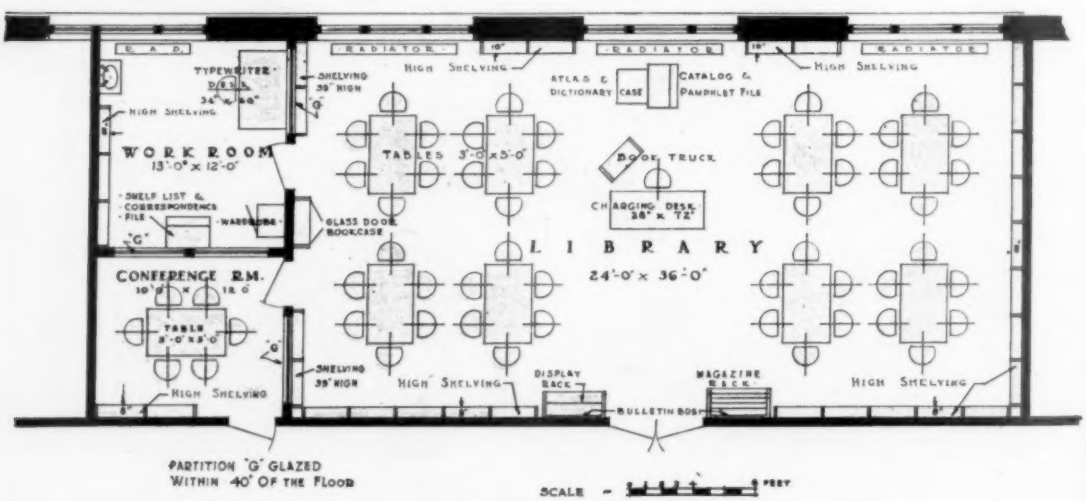
Facilities for the Technical Work of the Librarians

The library staff must next be considered. For the circulation of books an adequate desk is of course demanded. In the small school, a very simple desk will do, provided it has the right kind of interior, which includes a pull-shelf for returned books. Properly designed desks may always be had from reputable library equipment houses. Such desks are of sitting or standing height, and are supplied with necessary circulation files, cupboards, drawers, etc. In the growing library it may be well to decide upon a sectional desk, buying the front unit only to begin with, and adding wings as the occasion arises.

In the large school there will need to be more than one desk in the reading room, for the professional staff may number several librarians. In the small school a single all-purpose desk will do, provided the librarian has adequate work space somewhere else, preferably outside the main room.

The ideal work space is a small room opening from the reading room. It should be equipped with plenty of enclosed storage closets for new books in process of preparation for use, books and magazines under repair or being made ready for binding, and the librarian's working tools. Running water and a small sink are prime requisites, since paste and glue and ink mean soiled hands. For that matter, so do the playground and the gymnasium. Younger pupils must frequently be invited to remove the grime before handling books.

The furniture of the librarian's workroom is comparatively simple: a work table perhaps 3 x 5 feet with linoleum or other washable top and a



A CONVENTIONAL PLAN

Good example of standard arrangement adapted to the rectangular shape common to school buildings. Space made available for library purposes by the removal of a partition between two classrooms may ordinarily be treated thus

shallow drawer; a typewriter and its table; two chairs; a book truck; under some circumstances, a desk —but as a rule, none. If the room is well fitted with shelves, enclosed closets, and perhaps a locker, it need not be large, even in a large library. Convenience is the desideratum, not size. Space can easily be wasted here.

INEXPENSIVE BUT PRACTICAL
In the Young Senior High School, Knoxville, Tenn. Note simple painted shelves, magazine rack, and linoleum bulletin boards

The librarian makes and keeps elaborate card records, and the cards used are cut to centimeter measurements to accord with the practice of the Library of Congress, from which many printed cards are received. Card catalog files should therefore be made to centimeter measurements. They should also have rods and slides for keeping the cards in position. Such standardized equipment may well be purchased from a library equipment house, by and with the advice of the librarian, who, better than anyone else, can estimate the number of files needed. As a matter of fact, the librarian should always be an important partner in the matter of equipment. One who is well prepared for the job will invariably save the school costly mistakes.

So far, little has been said about the actual size and shape of the library room or rooms. These matters depend upon the general building plan and the functions the library is to fulfil in the educational program of the school. In general, the library should be easily accessible and well provided with daylight. Proximity to study halls is desirable, if there are such. In cases where the adult community is to use the library, there should of course be an outside entrance. But ordinarily a central location within the school building is better.

It is common practice to estimate the seating capacity on the basis of 10 per cent of the total school enrolment in the junior and senior high school, and roughly according to maximum class or platoon enrolment in the elementary school. This maximum being about forty, a few chairs are added for occasional pupil patrons who come unassigned. Since attendance in the elementary school is rather generally scheduled by class or platoon, the estimate for such schools seems more reliable than that for the secondary school where library attendance depends so largely upon study room facilities and school organization. In small high schools there is a discernible tendency to make one room serve as a combined library and study hall. In such cases it will be sufficient to follow the usual formulas for study room seating capacity. Such a combination in the larger school presents difficulties in supervision and function and should not be entered upon without due consideration of the administrative problems involved, such as the necessity of increasing the size of the library staff or assigning teachers to the task of library supervision. An alternative is so to locate the library as to give direct access, preferably through archways or swinging doors, to the study hall or halls. These rooms may thus be made to serve as auxiliary reading rooms, the library plant itself becoming relatively smaller. But many school officials and most librarians agree that the pupil gets a more pleasurable reading experience when it is carried out in the informal atmosphere of the library itself rather than in the study hall. Hence a demand for a big library reading room.

THE LIBRARY OF THE HIGH SCHOOL IN PRINCETON, N. J., IS AN EXAMPLE OF THE "PERIOD" STYLE

Another factor conditioning seating capacity is school organization. Some forms of supervised or directed study tend to limit library attendance very definitely and to put the emphasis upon classroom collections preferably kept fluid and alive by frequent exchange through the central library. In such situations pupil attendance is more or less restricted, though

thoughtful educators are apt to insist on the importance of a frequent central library experience for each pupil. On the whole, it is far better to overestimate than to underestimate the need for library seating capacity. Methods of school organization change readily, but buildings do not. Experience shows that most school libraries are far too small. Also, many have been tragically located between staircases or other architectural features making expansion impossible. The wise school official will locate the library where it can grow.

Beauty and Comfort in the Library

By inference it has probably been gathered that the library should be attractive. Many architects are seeing it as supreme opportunity for realizing the beautiful in school interiors. This is fortunate, because it coincides with the dictum that the library should be a cultural center. Obviously, the library is a place for artistic effects which will stir the imagination and insensibly add to the pupils' sense of esthetic values. But care should be exercised to see that the beauty is not of too formal a sort and that it does not interfere with convenience and efficiency in management. The library should be the hearthstone of the school, not the show place. Plenty of space should be provided for creative contributions from the pupils themselves—exhibit cases, bulletin boards. The librarian will also welcome such spaces because of the opportunities they offer for an ever-changing procession of pictures, posters, lists and publicity material, all of which have a place in giving atmosphere and encouraging reading.

Great care should always be exercised to see that the construction and shape of the interior and the arrangement of furniture make work easy and supervision effective. Too high shelving, long, narrow rooms, heating and plumbing fixtures occupying space which should be given over to wall shelving, failure to locate the librarian's desk (especially in the one-librarian library) near the workroom and reserve shelves, exits too numerous or too far removed for immediate supervision—these are all danger points to be avoided only by careful planning and by the advice of a competent librarian whose vision of the functions the library is to fulfil gives point and authority to advice.

Library equipment firms report a growing demand for "period" interiors and for furniture which breaks away from the rather plain but always substantial equipment of the earlier school libraries. They are accordingly producing chairs, tables, and files with turned legs, supporting crossbars, and other embellishments of the periods represented. There is no gainsaying that these add charm and coziness to library interiors. When purchased of reputable firms that construct well and can be relied upon to follow standard measurements for files and shelving, the school has nothing to fear. The initial expense of such equipment is, however, greater; and more time and effort are required in cleaning, for each added spindle, cut-out, and crossbar complicates problems of upkeep and repair.

Statistical Data

(Taken from the author's book "The Library in the School")

SHELVING

Length of shelves	3 feet
Depth of shelves	
Standard	8 inches
For oversized books	10-12 inches
For periodicals	12 inches
Thickness (hard wood)	13/16-7/8 inches
Height of case	
Base	4-6 inches
Cornice	2-3 inches
Total height for	
Elementary school	5-6 feet
Junior school	5-6 feet
Senior school	6 feet 10 inches to 7 feet
Space (in the clear) between shelves	10 inches (This is an average. Adjustable feature cares for oversized books on lower shelves.)

TABLES AND CHAIRS

	TABLES				CHAIRS TO MATCH
	Height	Width	Length	Diameter (Round Tables)	Height
Elementary library	26″, 28″, 30″	2′ 10″-3′	5′-6′ 6″	4′ -5′	14″, 16″, 18″
Junior high library	28″, 30″	ditto	5′-7′ 6″	3′ 6″-4′	16″, 18″
Senior high library	29″, 30″	ditto	ditto	4′	18″

Approximate table area per pupil	360 square inches
Linear extension (elbow room) per pupil	26″-30″ (*Note*: 26″ is the minimum in the elementary school or in the higher school with no pupils seated at table ends. 30″ is the usual estimate in the high school when pupils are seated at the ends.)

ARRANGING THE LIBRARY

Aisle space:	
Between tables (no chairs in aisle)	4′ minimum
Between tables (chairs in aisle)	5′ minimum
Between table ends and shelving	Same as between tables
Position of tables and book stacks	Ends to the light
Position of circulation desk	Near the exit, commanding the room
Location of files	Near the circulation desk, or the reference desk if there is one

See page 241 of this volume for a list of publications on library planning.

Office Practice—An Integrated Laboratory Project

BY EDWARD J. McNAMARA

PRINCIPAL, HIGH SCHOOL OF COMMERCE, NEW YORK CITY

A SURVEY made recently through the cooperation of a selected group of businesses proved conclusively that there was a definite need for a laboratory course in office practice in high schools. Commercial schools had been satisfied to meet the demands for stenographers, typists and bookkeepers, concentrating on these three important skills, and giving no time to machine training. But then, the average office was not "machine-minded." A typewriter and, possibly, an adding machine were sufficient equipment to transact the business of the day. Today, however, conditions are changed.

OFFICE LABORATORY, SHOWING TYPICAL OFFICE EQUIPMENT, DESKS, CHAIRS, ETC.

As a result of this survey and after considerable experimentation, a course in office practice was developed in the High School of Commerce in New York City. A model office has been set up in a classroom and The Universal Products Company organized to handle the sales and distribution of paints, varnishes, etc., in a businesslike fashion.* Our integrated laboratory project was opened only to a group of seniors who had had either bookkeeping or stenographic training in their course. Approximately 29 different positions were established, such as order clerk, bookkeeping machine operator, collection clerks, purchasing agent, etc. These positions are rotated among the members of the class.

To stimulate interest and to follow recognized business procedure, articles of incorporation are drawn up for The Universal Products Company by members of the office practice group at the first meeting of the class. At the same time, each member of the class is required to file a letter of application for the position in the company for which he feels he is best qualified through his previous training.

After the organization of the business, actual transactions take place and each individual student is held responsible for his own work exactly as he would be in a business organization. Orders are received by telephone, telegraph, mail and through outside salesmen. They pass through the various channels quickly, quietly and efficiently. These orders originate outside the classroom and are taken from actual orders originally placed with one of the largest paint concerns in the country.

In conducting the business of The Universal Products Company,

OFFICE LABORATORY, SHOWING MODERN OFFICE MACHINES

* Details of this set-up and the intricacies of its operation are included in "Office Practice—An Integrated Laboratory Project," by Scholl, Stern and McNamara, New York, 1933.

merchandise must be bought and sold. The machinery to carry on the various transactions was set up by selecting a group of five students to represent customers who place orders and salesmen from whom Universal Products buys.

The firms of the "Outside World" (as the customers and manufacturers are called), desiring to purchase or sell merchandise, place their orders or solicit them by (1) telephone, (2) telegraph, (3) mail, (4) personal purchase, (5) salesmen.

Each order is received by the order clerk and passes from him through the various departments necessary to complete the sale. The order travels to (1) pricing clerk, (2) credit manager, (3) billing clerk, (4) calculist, (5) accounting stenographer, (6) head bookkeeper, (7) accounts receivable bookkeeper, (8) receiving-shipping clerk.

Each position in the office requires a knowledge of filing. A complete and comprehensive filing system has been installed, and correspondence and orders are filed either alphabetically or numerically according to the department.

The following equipment has been installed in the High School of Commerce to facilitate the business operations of the Universal Products Company:

9 filing cabinets (4-drawer)
1 visible index file (7-tray)
12 single pedestal desks
6 single pedestal typewriter desks
9 swivel-back chairs
4 high chairs
13 straight-back chairs
18 steel desk trays
13 waste-paper baskets
1 desk telephone
2 Dictaphones
1 complete Ediphone unit
1 check writer
2 numbering machines
1 eyelet machine
2 stapling machines
1 conference table (60" by 34")
9 typewriters
4 bookkeeping machines (electric)
2 billing machines (electric)
4 calculating machines (2 electric, 2 hand)
2 adding machines (hand)
3 duplicating devices (1 Multigraph, 1 Mimeograph, 1 copy stamp)
1 addressing machine
Stationery: pencils, stenographic pads, carbon paper, letterheads, invoices, orders, purchase orders, envelopes, ledger cards, indexes, scratch pads, second sheets, etc.

Inasmuch as equipment in this amount is regarded as a norm for the 29 positions in the business machinery set up for this project, certain adjustments have to be made in accommodating classes whose numbers do not approximate that ideal. For instance, two groups of seniors are taking the course this fall at the High School of Commerce, one of 39 pupils and the other of 24. In the former class it is necessary to have some of the positions filled by two pupils, one acting in the capacity of assistant, while in the latter class the pupils must double up on positions.

Ideally, the equipment necessary to carry on such a project should be located in two rooms, to carry out the illusion that The Universal Products Company and the Outside World are two separate spheres. This ideal situation is illustrated in the accompanying photographs which were taken at a demonstration set up in a school at Washington for the Eastern Commercial Teachers Association. However, where space does not permit such an arrangement, it is possible to include all the necessary equipment in one large room.

TYPICAL OFFICE, WITH MIMEOGRAPH, FILES, AND OTHER NECESSARY EQUIPMENT

OFFICE OF THE "OUTSIDE WORLD"

The "office" of The Universal Products Company in every respect duplicates the office of any well-organized business, and proper relationships among the "employees" have been established in order to

develop a true understanding of the fundamental business problem. When skill and accuracy are obtained, the positions are rotated so that each student functions in a different capacity. In this way, he is able to put into practice the knowledge and skill he has acquired through previous years of study and to develop general intelligence and aptitude in this specialized field of practical business relations.

In this classroom characteristics may be developed which make for worthy citizenship. The transfer of students from one position to another impresses upon them the importance of harmony in an organization and the dependence of one employee upon another in order to maintain that harmony. The project carries the work through to a conclusion so that the student develops an understanding of the rights and obligations of a business man in his relation with another or with the public.

Utilizing Educational Talking Pictures in the Schools

BY FREDERICK L. DEVEREUX

VICE-PRESIDENT, ERPI PICTURE CONSULTANTS, INC., NEW YORK

THE major requirement for the effective use of educational talking pictures is a purposeful program in which the films are employed in learning situations planned for definite objectives and taught by teachers trained in the use of the medium. When films are shown in a casual, haphazard fashion, the films are entertaining, but there is usually little opportunity for the student to do anything about what he has seen and heard. From the administrator's point of view the following aspects must be considered in organizing and directing such a program: training teachers in the use of sound films and providing helpful supervision; integrating films with the local courses of study; selecting suitable educational talking pictures; and establishing the necessary mechanical services such as delivery of films, operation of equipment, storage and repairs, and clerical work. These activities will characterize any well-organized program for the use of educational films, regardless of the size of the school system.

Organizing the Use of Films

The sound film represents both subject matter and method; it possesses challenging possibilities for the alert teacher. When teachers have studied carefully the problems of film utilization, and when they have been helped to acquire skillful techniques, a sure foundation has been laid for extending the program.

There can be no arbitrary designation of a particular set of methods as the one correct way. Creative teaching displays an unlimited versatility of attack and of application. However, certain procedures tested through the actual classroom use of sound films can be pointed out.

A point to be stressed is that every film-showing should be purposeful. It should contribute partial solutions to problems which the student has recognized, or a wider outlook upon projects engaging his attention. The skill of the teacher will be evidenced by the manner in which he utilizes the unique resources of the film to meet the specific needs of his group.

Available films should be related with local courses of study, so that any films used become in reality illuminated sections of the curriculum. The outgrowth of this curriculum analysis, carried on by teacher committees, may be "Film Supplements to Courses of Study," printed or mimeographed pamphlets which are detailed descriptions, in aims and content, of appropriate films. Part of this work will involve the evaluation of available film subjects, to insure the use of films which are technically excellent and which make a definite contribution to the local educational offering. An appraisal form or checking list will make picture-rating a fairly objective process, particularly when the reviewers have evolved a set of standards for audio-visual instruction materials. Talking pictures purchased on the basis of standards are much more apt to exert a continuing influence in the classrooms.

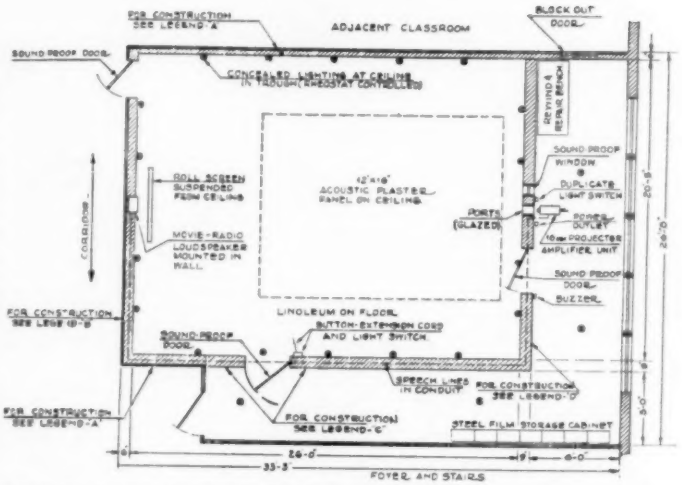
A very profitable study is that of investigating new projects which the talking picture could serve. In many schools the apparent dearth of instructional materials and teaching service has operated to bar the way to desirable extensions of the local educational program. The talking picture has stimulating possibilities for many areas outside regular classroom instruction. In adult education, for example, music appreciation, travel courses, parental education, and avocational activities illustrate but a few of the fields in which the sound film can enlarge the cultural opportunities of the men and women in the community.

The mechanical details connected with the use of sound films—handling requisitions, making deliveries, operating the projector, and the like—should settle into a smoothly running routine which requires a minimum of attention from the teacher. The talking picture should be so easy for the teacher to use that he can turn to it as readily as he turns to a map on the wall in present classroom instruction.

Physical Requirements for Classroom Projection

Although sound films can be shown in almost any classroom, it should be remembered that excellence of sound and picture reproduction, and facility of placing the equipment in operation, are of major importance. The essential requirements are provisions for darkening the room, an electric power supply, and desirable acoustic conditions. The room should be rectangular in shape and of sufficient size so that the group of students may be seated within an angle of 60° from the center of the screen, with the front row at least 9 feet from the screen. Opaque shades may be installed, with side and bottom slots. It is desirable to have electrical outlets at the front and at the rear of the room.

Instead of shifting projection equipment from room to room, an audio-visual studio[1] or classroom theater may be constructed. To illustrate the changes necessary in remodeling a classroom for this purpose, specifications recommended recently for a small school system are given here. The chart shows the floor plan of the proposed studio, adapted from an unused classroom centrally located on the first floor of the building. The aim was to create a special room, equipped for the easy use of talking pictures, and acoustically treated to provide optimum sound within the studio and to eliminate disturbance to adjacent classrooms.



FLOOR PLAN OF AN ELEMENTARY SCHOOL CLASSROOM REMODELED AS AN AUDIO-VISUAL STUDIO

"A"—Present wall: 2" air space; 3" terra-cotta tile wall; ½" acoustic plaster; + ½" ground coat for interior surface of tile wall.
"B"—Same as "A" except ½" ordinary plaster substitute for acoustic.
"C"—Double wall 3" terra-cotta tile with 2" air space between. ½" acoustic plaster + ½" ground coat for interior surface of inner tile wall.
"D"—Same as "C".

A partition is extended lengthwise from the present jog at the corridor entrance to another partition extending across the room about 6 feet back from the windows. This makes an inside room with no problem of excluding light and with better control of acoustical conditions. Another entrance from the corridor is provided.

The lighting of the studio is concealed in a metal trough which encircles the walls just below the ceiling. It is controlled by a rheostat switch, so that varying degrees of illumination may be secured. An outlet is provided at the front of the room. At a suitable height in the front wall there is a recessed loudspeaker which may be used both for sound picture projection and for radio. The speech cord from the loudspeaker to the projector unit in the rear is laid in conduit. The roll screen is suspended by metal brackets from the ceiling. Lighting switches are located at the side entrance and also at the operator's stand in the booth.

The space in the rear becomes a projection booth; there is ample room for projection equipment, a re-wind bench, and a steel cabinet for films. The wall which separates the studio from the projection booth is provided with a sound-proof door, two ports for motion picture projection, and a sound-proof window for the operator's use. The 16-mm sound equipment is mounted on a movable stand with an outlet conveniently located nearby. Within the studio there is a button and cord connected to a buzzer beside the operator's stand, which will enable the teacher to signal the operator to begin projection and to adjust the volume of sound.

An effective method of sound-proofing the walls of this studio,[2] considering existing construction, would be as follows: the installation of a 3-inch hollow terracotta tile wall to be spaced 2 inches from the two existing walls, together with the construction of a double wall of this same thickness of material, with a 2-inch air space between, for the two individual walls to be added under this plan. In the event that interfering noise is transmitted through the floor above this room, it will also be necessary to provide a suspended plaster ceiling with an intervening air space of not less than 6 inches. It is recommended that the three doors, indicated as leading directly to the studio, be of sound-proof construction.

Assuming an average attendance of approximately 45 auditors and the probable installation of the plain wooden type of seats, the following method of interior acoustic treatment is suggested: The application of ½-inch Sabinite

[1] For a discussion of the features of an audio-visual studio, see Devereux, Frederick L. and Others, "The Educational Talking Picture," pp. 168-175. Chicago: The University of Chicago Press, 1933.

[2] The recommendations for acoustic treatment were prepared by C. C. Potwin, under the direction of S. K. Wolf, Acoustic Consulting Manager, Electrical Research Products, Inc.

Acoustical Plaster to the full area of the rear wall surface and to the full area of both side wall surfaces, extending down from the ceiling to approximately a 5-foot wainscot line, this treatment to be applied to the interior surface of the tile walls adjacent to the studio. It will be necessary to apply at least a ½-inch ground coat before the application of the ½-inch thickness of acoustic plaster. The area below the 5-foot wainscot line may be finished in ordinary plaster or a wood wainscot, as desired. The front wall surface (wall containing loudspeaker) should be finished in ordinary plaster. A further recommendation is the application of a panel of acoustic plaster of dimensions approximately 16 feet for the length by 12 feet for the width, to be centered within the rear two-thirds of the ceiling surface.

Sources of Educational Talking Pictures

When the educational talking picture first appeared, one difficulty was the limited number of film subjects available. That condition is rapidly disappearing; the production of films for school use will undoubtedly be stimulated by the number of 16-mm sound-on-film projectors which are appearing on the market.

One of the best ways of canvassing the talking picture field is to secure directories of film sources. Koon[3] lists a number of these directories and film catalogs. Of the film catalogs, one of the best known is the "1000 and One, a Bluebook of Non-Theatrical Films."[4] Annual editions make this catalog a comprehensive, up-to-date source of information.

Another way of becoming acquainted with available films is to write the leading producers of educational subjects for descriptions of their materials. The teacher's manuals accompanying films should also be analyzed. Various governmental agencies have silent and sound film libraries. Many of the manufacturers of 16-mm sound picture equipment now provide film distribution service. The University of Chicago is well under way with a series of educational talking pictures in the physical sciences. It is important to keep in touch with current educational film releases through the news notes and reviews in the visual instruction periodicals.

[3] Cline M. Koon: "Motion Pictures in Education in the United States," pp. 92-96. Chicago: University of Chicago Press, 1934.

[4] Published by the *Educational Screen*, 64 East Lake Street, Chicago, Ill.

UNIVERSITY AND COLLEGE LIBRARIES

Suggestions Presented by the Planning Committee of the American Library Association at the 1934 Conference of the Association

College libraries should contribute to the specific objectives of the college. They must be greatly expanded to serve adequately the educational and cultural needs of students and faculty.

Changing methods of instruction and the relation between the use of library books and student progress must be studied as the basis for continuous modification of the library and its service.

University and other libraries for research should be closely coordinated (by voluntary cooperation and planning) with each other and with college, state, and large public libraries to avoid unnecessary duplication and to increase the availability and accessibility of needed books, manuscripts, and related materials to research workers in all parts of the country.

Universities and colleges, especially those supported by the state, should be prepared to meet the library needs of research workers throughout the state and to support the work of their extension departments in so far as these needs cannot be met by other library agencies in the state.

Forms and Equipment for the Keeping of Student Records

BY IRA M. SMITH
REGISTRAR, UNIVERSITY OF MICHIGAN

"A COLLEGE owes it to the parents who entrust students to its care, to the students themselves and to other institutions to which transcripts are sent, that *complete* records pertaining to each student be made out and permanently protected from the possibility of either damage by fire or tampering by irresponsible individuals." [1]

The use of modern steel filing cases (see Fig. 1) is a precaution which will safeguard records against fire hazard and tampering and so discharge that obligation on the part of the college authorities. The purpose of this article is to discuss other aspects of student record keeping with regard to the fulfilling of the above ideal.

Data Which Should Be Preserved

Out of experience with the scant records of the last quarter of the 19th century has come an increased demand for more complete data concerning the entire school record of each student, including character and personality traits in addition to the report of grades in the academic courses pursued. In recognition of that trend, a committee of The American Council on Education undertook to prepare record forms to be recommended for both types of data, and in the eight years that have intervened over 120 institutions of higher education have adopted the suggested forms with some slight changes to meet their own requirements.[2]

A form used in the School of Music at the University of Michigan (Figs. 5 and 6) is typical of the tendency to make the entire academic history a comprehensive whole. The supplementary record blank was worked out to give additional information about individual records in practical music courses which are usually privately conducted. This amplification of the complete record leaves very little ground for misinterpretation of a transcript. The scholastic master record and the supplementary data are printed so that the entire record is visible when they are placed in the binder. Thus it is possible to get a full statement concerning any single course relative to individual work done in that course, and also grade secured, without the necessity of turning a page.

Fig. 2 shows the form used by one institution in the request for personal data. This is filled in for each student by each of his instructors. The resulting data are regarded as strictly confidential, and it is impossible for any student or even the registrar's office force to trace the ratings given to a particular student by any member of the faculty. The records are open only to the administrators, and all others must have special permission before being allowed access to them.

[1] Zook, George F., Director of The American Council on Education, in his chapter on Student Records and Accounting in "Higher Education in America," 1930, pp. 460-87.

[2] A more complete report on personal data records used by colleges will be found in the July, 1933, "Bulletin of the American Association of Collegiate Registrars," Roy W. Bixler, Editor, University of Chicago.

Courtesy of the Automatic File & Index Company

FIG. 1. A TYPICAL COUNTER FILE IN A REGISTRAR'S OFFICE INSTALLATION IN BASCOM HALL, UNIVERSITY OF WISCONSIN

Name of student.....

Personal Data Request	Rank
1. Truthfulness and honesty	
2. Moral cleanliness and temperance	
3. Regard for others	
4. Sterlingness of character	
5. Address and manner	
6. Disposition	
7. Leadership	
8. Native intelligence	
9. Judgment	
10. Energy and industry	
11. Standing in class	
12. Health and physical energy	

GRADES: E (quite exceptional, superior); A (above the average); M (medium, average); B (below the average); I (decidedly inferior, very poor);

Date .....

FIG. 2. THIS FORM IS NOT SIGNED BY THE INSTRUCTOR

The Making of Records

The technique of recording data has been greatly influenced by the necessity of providing original records from which transcripts can be made easily and cheaply. The use of loose-leaf sheets of tracing cloth has earned recognition because it is easy to reproduce them in the form of black and white prints. The Carnegie Institute of Technology, the University of Pittsburgh and Pennsylvania State College pioneered in this development, and the system is spreading rapidly.

Courtesy of Remington Rand Inc.

FIG. 4. A LOOSE-LEAF BINDER FOR FILING PERMANENT RECORDS

The permanent records, or master sheets, are made on tracing cloth. At Michigan "Dietzgen's White Pencil Cloth No. 138" is used. Columbia University, however, uses a special No. 16 Dalton or Crane bond paper which seems to have enough translucency to give very good results. The sheets are then kept together in loose-leaf binders (see Fig. 4, above).

Approximately 400 records should be filed in a binder for convenience and ease of handling.

The Making of Transcripts

The excessive cost of issuing transcripts by the older laborious methods has created much activity in developing cheaper methods of duplicating records. The many and varied types of methods now in use are reflected in the incoming mail of the admissions office of any large university where many credentials are received from students desiring to transfer from other institutions. A day's mail includes long-hand and typewritten transcripts as well as those produced by photostat, dexigraph, blueprint, B-W, Ozalid or Leica Camera process. Other methods are being developed by many registrars who have been and are now working in close cooperation with industrial concerns.[3]

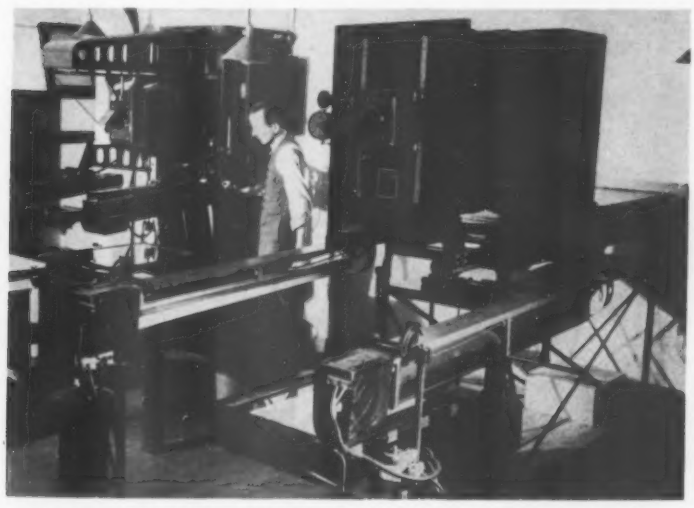


FIG. 3. PHOTOSTAT MACHINES INSTALLED IN THE LIBRARY, UNIVERSITY OF MICHIGAN

At least one registrar's office is using three forms of transcript—the photostat process, the B-W process, and the regular typewritten form. This is necessary during the transitional period of changing from the card method to the tracing-cloth method. The photostat process is used for transcripts of records of former students which

[3] Many of these processes are more fully explained in the Bulletin of the 1934 Proceedings of the American Association of Collegiate Registrars; Roy W. Bixler, Editor, University of Chicago.

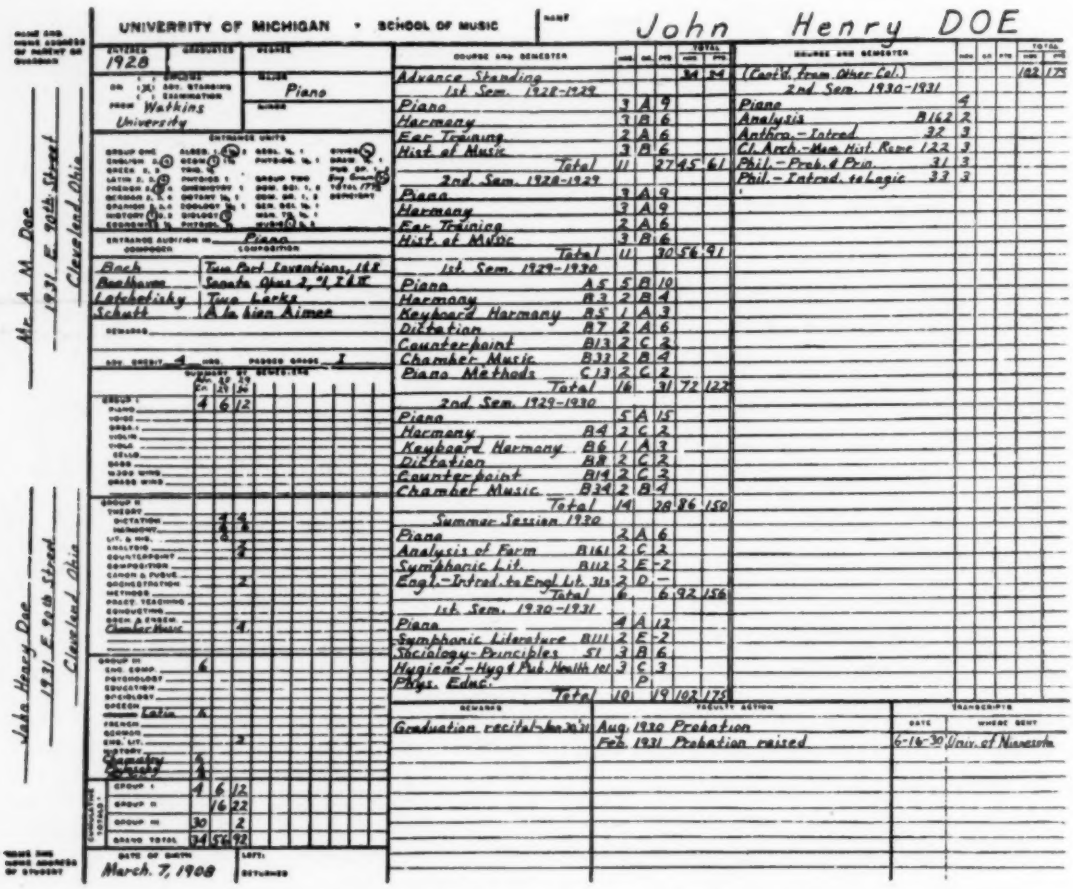


FIG. 5. THE FOUR-YEAR ACADEMIC RECORD ON ONE CARD

have not been transferred to tracing cloth. The typewritten forms are used for the extremely old records which are on forms not suitable for photostating, since these old record forms do not contain catalog descriptions of courses. The B-W process is used for the newer records now on tracing cloth.

The photostat has been used extensively at Michigan for the preparation of transcripts, and in practice this system has been found cheaper and better than the old 100 per cent clerical method. From the cost standpoint, reproduction of 1,000 records (showing the front side only) would cost only 4 cents each. This figure includes the cost of chemicals, paper and labor, but does not take into consideration such overhead expense as water, light, heat, etc. As far as legibility is concerned, the photostat gives results as perfect as one could hope for. Even with 45 per cent reduction the transcript is easily read and legible in every way. Accuracy is of course 100 per cent perfect. Another advantage of this method is that the photostat may be used for copying everything, from the permanent student records to the reproduction of old maps and valuable historical documents.

The photostat department of the University of Michigan spreads over two rooms in the basement of the library, and is a fully equipped layout. One room is used for the office of the operator, and there two large photostat machines are installed and operated (see Fig. 3). The second room is equipped as a developing room and chemical storage place. There are complete facilities for washing and drying the completed copies. Any type of reproduction can be accomplished there.

Conclusion

The importance of collecting personal data is indicated by reports from higher institutions, and from college and university placement bureaus, as well as from such organizations as the Educational Records Bureau, The American Council on Education, the Progressive Education Association, and the Carnegie Foundation for the Advancement of Teaching in its work on the study of relations of secondary and higher education in Pennsylvania. From official reports of these organizations, as well as from reports directly from colleges and universities, we feel that the cause can best be advanced by giving publicity to what has been reported and by encouraging other institutions to

UNIVERSITY OF MICHIGAN
SCHOOL OF MUSIC

NAME John Henry DOE

SUPPLEMENTARY RECORD

1st sem. 1928-1929
COURSE Piano INSTRUCTOR Rhead

COMPOSER	COMPOSITION	
Bach	Prelude and Fugue #3	**
Brahms	Capriccio Opus #2	***
Chopin	Nocturne C Minor	***
Beethoven	Thirty Two Variations	*
Debussy	Reflets dans L'eau	*
Rachmaninoff	Toccata and Fugue in D Minor	*
Chopin	Scherzo C# Minor	
Technic Studies		

REMARKS:
HOURS CREDIT 3 MARK A GRADE II

2nd sem. 1928-1929
COURSE Piano INSTRUCTOR Rhead

COMPOSER	COMPOSITION	
Haydn	Andante and Variations	*
Beethoven	Sonata Opus 10 #3	**
Liszt	Italian Sonata	**
Debussy	Mazurka	**

REMARKS:
HOURS CREDIT 3 MARK A GRADE II

1st sem. 1929-1930
COURSE Piano INSTRUCTOR Lockwood

COMPOSER	COMPOSITION	
Bach	Prelude and Fugue E Minor	**
Chopin	Etude A Minor	***
	Etude F Major	***
	Etude E Major	***
Debussy	Prelude I	
Beethoven	Sonata Appassionata	
Brahms	Intermezzo	**
Gliere	Prelude C Minor	**

REMARKS:
HOURS CREDIT 5 MARK B GRADE III

2nd sem. 1929-1930
COURSE Piano INSTRUCTOR Lockwood

COMPOSER	COMPOSITION	
Brahms	Exercises Vol II (Five)	
	Opus 24 1st 6 Variations	
Scarlatti	Sonata in D Major	
Liszt	Spozalizio	**
Niemann	Singing Fountain	**
Ravel	La Vallee des cloches	
Mozart	Concerto in D Minor	
Bach	Prelude E♭ Minor	**
	Fugue E♭ Minor	

REMARKS:
HOURS CREDIT 5 MARK A GRADE III

Summer Sess. 1930
COURSE Piano INSTRUCTOR Ohlheberg

COMPOSER	COMPOSITION	
Chopin	Concerto in E Minor	**
Ravel	Oiseaux Tristes	**
Rimsky-Korsakoff	Elegie	**
Brahms	B Minor Capriccio	

REMARKS:
HOURS CREDIT 2 MARK A GRADE IV

1st sem. 1930-1931
COURSE Piano INSTRUCTOR Ohlheberg

COMPOSER	COMPOSITION	
Bach	Prelude and Fugue in C# Minor	***
Chopin	Scherzo Opus 39	**
Medtner	Fairy Tale Opus 26, No. I	***
Scriabine	Etude Opus 8, No. I	***
Ravel	Oiseaux Tristes	***

REMARKS:
HOURS CREDIT 4 MARK A GRADE IV

GRADUATION RECITAL: January 30-1931

Bach	Prelude in C Major
"	Prelude in E♭ Minor
Chopin	Prelude in C# Minor
Niemann	Singing Fountain
Scriabine	Berceuse
Liszt	Spozalizio
Medtner	Fairy Tale Opus 26, No. I
Brahms	Capriccio Opus 76

FIG. 6. THE SUPPLEMENTARY RECORD OF WORK IN PRACTICAL MUSIC COURSES

realize their obligations pertaining to the importance of keeping accurate and complete records, as expressed by Dr. Zook in the excerpt quoted in the opening paragraph of this paper.

Continued from "School Library Planning and Equipment," by Lucile F. Fargo, pages 227-232:

WHERE TO GO FOR FURTHER INFORMATION:

Childs, F. A.: Planning Libraries for Elementary and Junior High Schools.—*American School Board Journal*, January, 1931; pp. 64-66.

Engelhardt, N. L.: Standards for Junior High School Buildings.
Gives a complete section devoted to library planning.

Fargo, L. F.: The Library in the School—American Library Association, 1933, Chapter IX.
Very complete discussion based on standard practice. Dimensional tables, cost estimates, floor plans, pictures.

Power, E. L.: Library Service for Children.—American Library Association, 1930; pp. 123-52.
Deals with the children's room of the public library, but most of the discussion applies to the library in the elementary school.

White, Mrs. R. E.: Making an old Classroom into a Library.—In American Library Association Education Commitee Handbook for Teacher-Librarians, 1931; pp. 44-49.

Witmer, E. M.: Notes on Library Planning in Denver Public Schools.—*Library Journal*, March 1, 1928; pp. 205-10.
Covers elementary, junior and senior high schools. Plans and pictures given.

ART METAL CONSTRUCTION CO.

Jamestown, New York

BRANCH OFFICES

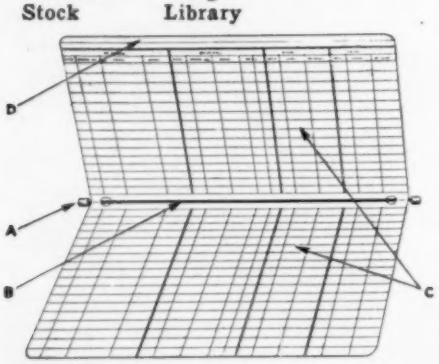
Albany, N. Y., 75 State Street
Baltimore, Md., 201-203 Union Trust Building
Boston, Mass., 94 Federal Street
Chicago, Ill., 173 West Madison Street
Cincinnati, Ohio, 1407 Union Central Building
Cleveland, Ohio, 220 Hanna Building
Detroit, Mich., 333 State Street
Hartford, Conn., 75 Pearl Street
Jamestown, N. Y., Jones & Gifford Avenue
Kansas City, Mo., 110 Scarritt Building
Los Angeles, Calif., 942 South Hope Street
Memphis, Tenn., 1759 Glenview Avenue
Newark, N. J., 1010-1014 Raymond-Commerce Building
New York City, 369 Broadway
Philadelphia, Pa., 1107 Architects Building
Pittsburgh, Pa., 1215 Plaza Building
Washington, D. C., 337 Southern Building
London, England, 199-203 Buckingham Palace Road

POSTINDEX VISIBLE FILES

—for all school and college records. Send for sample forms of any record in which you are interested.

Student—Permanent Scholastic
Student—Program
Student—Attendance
Student—Vocational Analysis
Student—Health
Student—Job Placement
General Ledger
Dormitory Ledger
Laboratory Ledger
Alumni Subscription
Teachers' or Instructors' Personnel and Salary
Purchase **Budget**
Stock **Library**

POSTINDEX
Drawer Cabinet
Visible File.



The Simplicity of the POSTINDEX Visible File Principle

A. This is the trunnion that operates in the channel at the side of the panel.

B. This is the anti-rust tempered spring wire that enables you to snap the form in and out of the panel at will.

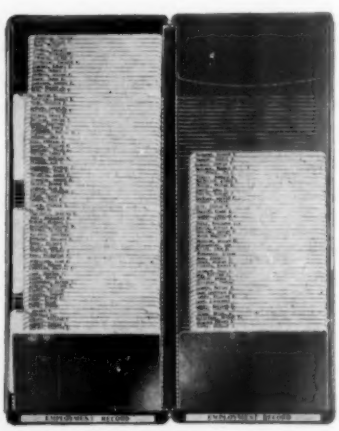
C. This shows two pages of the 4-page form, which gives you a writing area on an 8 x 5-inch form of 160 square inches, equal to a ledger page of 10 x 16 inches.

D. This shows the visible line where you type the name and address, or subject of the record you desire to carry.

. . . Adaptable to any record
. . . Four types of cabinet . . .

POSTINDEX cards are **ready to use** . . . there are no clips to put on . . . no holes to be punched . . . no edges to be folded over . . . no tabs to be glued to cards. After typing or writing the student's name and other information necessary, it takes but a second to insert the wire in the holes and snap it into the panel frame where the record stays ready to serve you instantly.

Changes are most easily and quickly made in Postindex files because of the exclusive Postindex card holder. Just snap it in . . . or out.



POSTINDEX Flat Book Visible File. Capacity of each Flat Book is 150 records. Any standard size of record Cabinets provide for 5, 10, 15 or 20 Flat Books.

THE AMERICAN SCHOOL AND UNIVERSITY

RECORD-KEEPING EQUIPMENT FOR SCHOOL SYSTEMS

"Director" Files

"7700 Line" Standard Height 24" deep.
"7600 Line" Standard Height 28" deep.
"7200 Line" Counter Height.
"7300 Line" Desk Height.
"7500 Line" Five-Drawer 57½" Height.
"7900 Line" Five-Drawer 60½" Height.

"Director" Files are built for easier filing and faster finding. They provide several thousand combinations of cabinets and inserts to accommodate every type of record.

Features—Friction Clutch Compressor. Wide-Tread Rollers. Thumb Latches. Snap-Out Guide Rods. Automatic Plunger Lock. Solid Bronze Hardware. Rubber Bumpers.

Style 7641 4-Drawer Letter File

For School Records such as:
General Files (Dewey Decimal and alphabetical filing)
Supply Lists
Stock Records
Textbook Inventories
Catalog File
Purchase Order Register
Attendance and Scholarship Records
Tests and Examinations

Letter Files, Styles 7641, 7741, 7241, 7341, 7541 and 7941

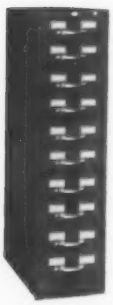
For such records as:
Class Record Sheets
Census Enumerating Sheets
Athletic Records
Catalog File

Cap Files, Styles 7645, 7745, 7245, 7345, 7545 and 7945

Style 7545 5-Drawer Cap File

Send for Catalog showing all lines of Art Metal Vertical Files

Card Index Files



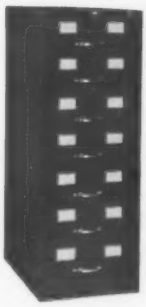
Style 7647 for 5" x 3" Cards

Styles 7647, 7747 for 5" x 3" Cards

Attendance Officers' Reports
Students' Programs
Residence Cards
Catalog Index
Transfer Cards
High School Program Card

Style 7749 for 6" x 4" Cards

Admission, Discharge and Promotion Cards
Textbook Records
Registration Cards
Office Record Cards
Employment Certificate Forms
Reports of Absences and Tardiness
Pupil's Report Cards
Educational Supply Record



Style 7651 for 8" x 5" Cards

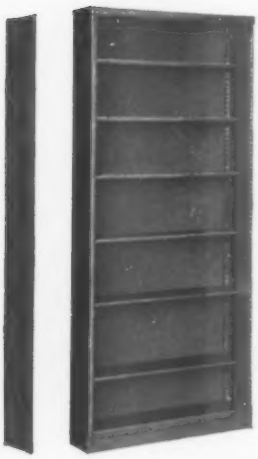
Styles 7651, 7751 for 8" x 5" Cards

Permanent School Census Card
Probation Reports
Monthly Educational and Attendance Records
Physical Record Cards
Teachers' Record Cards
Dental Card
Elementary School Record Card
Teacher Rating Cards
Block Survey Cards

Style 7785 for 9" x 6" Cards

For such records as:
Attendance Summaries
Teachers' Monthly Attendance Reports

Send for Catalog showing all lines of Art Metal Vertical Files



Bookcases and Space-A-Shelf Units

Every school needs book shelves and enclosed bookcases for textbooks, directories, library books, reference books and supplies.

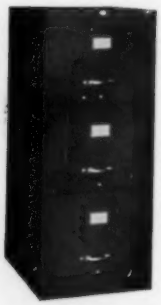
Art Metal Space-A-Shelf Book Units offer low cost book storage with good appearance. These units have detachable ends, and standard library shelf, and are slotted to provide easy adjustment without fastenings. May be shipped or moved K.D. but are permanently rigid when assembled. (Illustrated at left.)

Art Metal Sectional Steel Bookcases are strongly built and have disappearing glass doors with a new channel and roller construction which operates very smoothly and easily. All sections, tops and bases are attractively and durably finished in Art Metal Olive F, Mahogany, Walnut or any plain enameled color.

These Art Metal Bookcases protect volumes from dust, vermin and dampness. They are easily assembled and rearranged at will. Economically priced.

Send for Catalog showing complete line of Art Metal Bookcases

Art Metal Sectional Bookcases



"Jumbo" File, Style 7783

(Files drawings and papers up to 14″ x 18″)

For large size school records, such as extra large miscellaneous papers, blueprints, drawings, photographs, architectural plates, age computing tables, record of progress and age of children; various charts, reports, large catalogs, etc.

Send for Catalog showing all lines of Art Metal Vertical Files

Steel Planfiles

Made in various sizes for 36″ x 24″, 42″ x 30″, 48″ x 36″ and 56″ x 24″ drawings. Every School System has engineering records such as drawings, blueprints, tracings, property plans which are very valuable. Planfiles are also convenient for filing tables, charts, work sheets, reports and graphs, or anything too large to be filed in ordinary files.

Send for Catalog showing the complete line of Art Metal Planfiles

Storage Cabinets

Art Metal Storage Cabinets are needed for supplies and materials that must be kept covered or under lock and key — especially such things as office supplies, stationery, requisitions, order blanks and similar supplies.

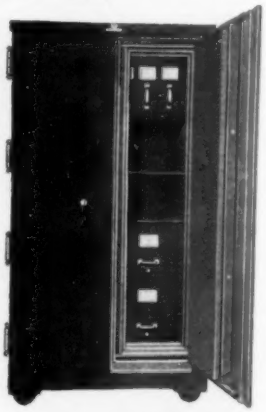
These cabinets are of electrically welded construction, finished in Art Metal Olive F, Mahogany, Walnut, French Gray or White. They are made in several styles and sizes in full height (78″), counter height, and desk height.

Send for Catalog showing the complete line of Art Metal Storage Cabinets and Wardrobes

Underwriters' AT-20 and BT-20 Fire-Safes

Art Metal Fire-Safes are especially needed in the School Administration Office and the Superintendent's and Principal's Offices for such records as: School Bond and Insurance Records, Financial Records, Minute Book, Motions History Book, Rules and Regulations, Payroll, Survey Book, Reports, Tables, Charts, etc.

Send for Catalog showing the complete line of Art Metal Fire-Safes



School Lockers

Art Metal Lockers are built on the unit principle, each locker having its own welded front frame and door of 16 gauge, best furniture grade steel. They have the durability to maintain good appearance under hard usage. When recessed into walls full service may be expected for the lifetime of the building in which they are installed. Any number of lockers may be grouped side by side or back to back. Malleable iron legs with adjustable footings, or continuous base. Finishes: S-F Brown; Olive F; French Gray.

Type S Single-Tier Lockers—Twenty-one sizes. Standard equipment includes hat shelf with rolled front edge, three nickel-plated wall hooks and one shelf hook.

Type D Double-Tier Lockers. Eleven sizes. These lockers are used for school gymnasia.

Type 2-G Gym Suit Lockers—With this combination all of the gym-suit locker users use the single-tier locker for street clothing. Any ratio of gym-suit lockers to single-tier lockers may be arranged.

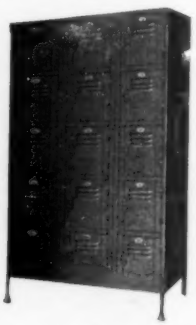
Type B Compartment Lockers—These lockers may be had five or six tiers high in the 12-inch height; four tiers high in the 15-inch height and five tiers high in the 14⅝-inch height.

Send for Catalog showing complete line of Art Metal School Lockers

Type S—Single Tier

Type D—Double Tier

Type 2-G Gym Suit



Type B Lockers

BAUSCH & LOMB OPTICAL COMPANY

674 St. Paul Street, Rochester, N. Y.

New York Chicago Boston Los Angeles San Francisco
London, England Frankfurt A/M, Germany

K O S B BALOPTICON

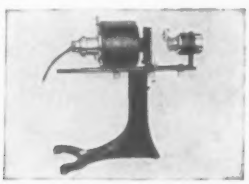
The air cooled K O S B Daylight Balopticon for lantern slides and opaque objects no longer requires the modern lecture room to be pitch-black. The instructor lectures and conducts recitations in daylight, operating the Balopticon from the front of the room, using a translucent screen.

For brilliance and clarity of opaque projection, this instrument has no equal. A built-in blower cooling system and even illumination are other features of the K O S B.

B D T BALOPTICON

Model B D T Balopticon is a slide projector mounted on a heavy adjustable tilting base. This mounting allows for changing the projection angle for screens at various heights.

Projection distances range from 15 to 60 feet, depending upon the lens equipment, and the image can be as large as ten feet on its longer side. Still film, micro-projector and overhead projector attachments are available. Available without tilting base.



TRIPLE PURPOSE MICRO-PROJECTOR

Can Be Used to

Project mounted specimens on a screen or wall.

Make drawings of microscopic subjects.

Project living specimens in liquids on a screen.

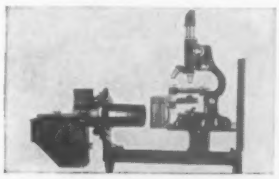
OTHER BAUSCH & LOMB INSTRUMENTS

The instruments listed herewith are but a small part of the complete line of B & L products for the Educational field. If you have need for advice or information on any optical products whatsoever, Bausch & Lomb will welcome the opportunity to be of service to you.

L R M BALOPTICON

Your auditorium or large lecture hall should be equipped with the L R M combination distance projector — for both opaque objects and slides. Specially designed parabolic reflectors produce an unusually bright shadow-free image from a 500-watt lamp. This feature has made the L R M an outstanding Balopticon.

Standard slides, and opaque objects up to 6 inches square, or 6-inch square sections of larger objects can be projected.



A NEW MICRO-PROJECTOR

Now Bausch & Lomb offers a new Micro-Projector at a new low price. Any standard compound microscope can be used.

Simply place the microscope on the stage of projector in an upright position, apply the prism reflector cap to the microscope and focus the illuminator.

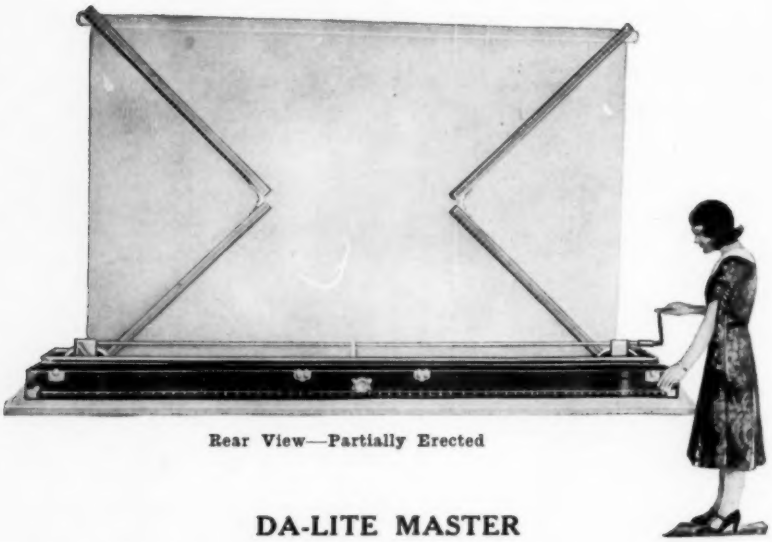
Investigate this new instrument before completing your plans for science laboratory development.

BALOPTICON TABLE

The B & L Balopticon Table provides a means of placing a Balopticon where it can be used to best advantage. It is portable (rollers on two front legs), and has a shelf underneath for slide boxes. Ample room on surface for slides being used.

DA-LITE SCREEN COMPANY, INC.

2723 North Crawford Ave.
Chicago, Illinois



Rear View—Partially Erected

DA-LITE MASTER

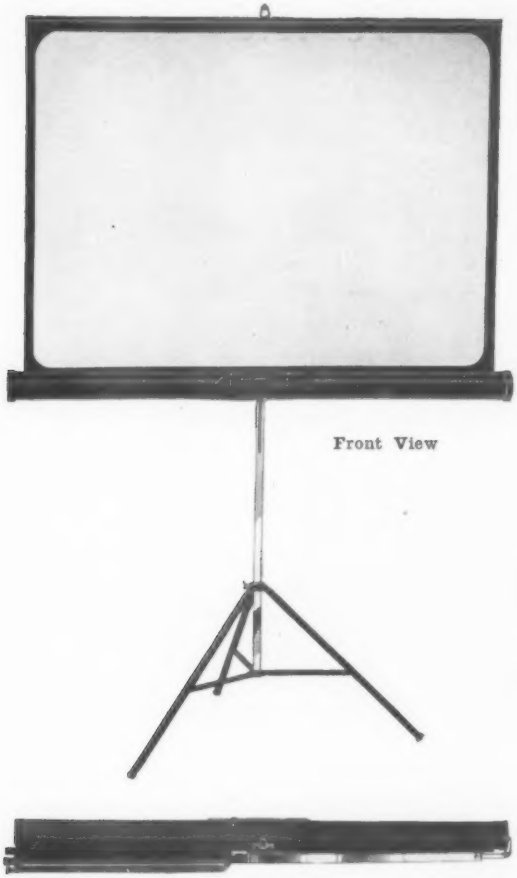
The Master is operated by means of a patented wormgear crank driven device which insures easy and positive control. The largest size (9′ x 12′) can be fully erected, ready for the picture, in thirty seconds.

Front View

Model F Folded

MODEL F

This is a table model made in sizes up to 52″ x 72″. The screen is mounted on a spring roller and protected by a metal case having rubber tipped feet. When in use, the screen is supported in the rear by means of a collapsible center support.



Front View

Challenger Folded

CHALLENGER

The Challenger type screen is made in six sizes up to and including 70″ x 94″. This screen can be set anywhere. The height of the screen from the floor is adjustable. Folds into a compact unit as illustrated. One of our most convenient and popular models.

MODEL B

This is a wall type screen. It is housed in a metal case with a dark baked stipple finish. This model is made in standard sizes up to and including 52″ x 72″. Our Model C, another wall type screen without the metal housing, is available in sizes up to 12′ x 12′.

Past Performance—

An Augury for the Future

This year we are celebrating our twenty-fifth anniversary. We pioneered with the industry and have been building bigger and better screens ever since.

For years to come, we hope to be rendering our customers the same conscientious and economical service that has characterized our relationships in the past.

At the Present Time

Right now our facilities for supplying our customers with any type of reflective surface and style of mounting to meet all projection requirements are unexcelled.

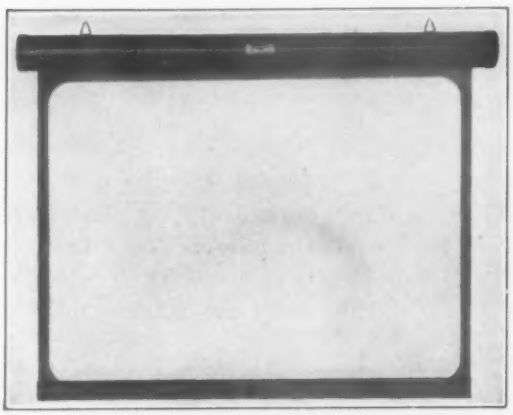
Screen Material

The kind of reflective surface that will give the greatest efficiency depends largely on the type of your light source and the width of your auditorium. To meet all possible conditions, Da-Lite offers four general types of screen surfaces—Beaded, Silver, Mat White, and Translucent.

Mountings

Screens for theatres and large auditoriums are mounted on frames or scenic rollers. The Da-Lite Amateur screens offer a wide selection of mountings (fifteen standard types) all of which are characterized by their simplicity of operation and quality of materials and workmanship.

Circulars available.



MODEL B

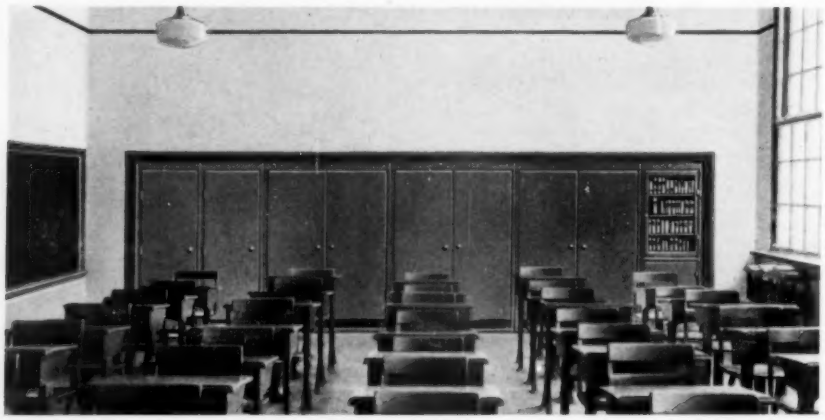
THE GENERAL FIREPROOFING CO.

Youngstown, Ohio

BRANCHES

BOSTON—74 Franklin St.
CHICAGO—36 S. State St.
CLEVELAND—1233 Prospect St.
HARTFORD—8 Ford Street
LOS ANGELES—1733-35 So. Los Angeles St.
MINNEAPOLIS—310 N. First St.
NEWARK—17 Academy St.
NEW YORK—500 Fifth Ave.
PHILADELPHIA—1425 Chestnut St.
PITTSBURGH—642 Grant St.
ST. LOUIS—610 Arcade Bldg.
SAN FRANCISCO—534 Fourth St.
WASHINGTON—201 Mills Bldg.

Dealers Elsewhere. Write for Name of One Nearest You



GF ALLSTEEL WARDROBES — GAGEN CABINET TYPE

Factory Built — Fully Assembled

THE ONLY WARDROBES THAT CAN BE INSTALLED IN ROUGH UNFINISHED RECESSES —

You Save —

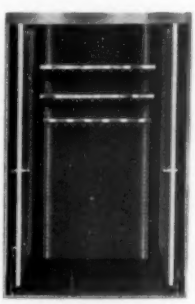
Grounds
Plastering
Ceilings
Ventilators
Flooring
Inside Trim
Painting
Maintenance

All Wardrobe Cabinets are built of steel, electrically welded, fully assembled at the factory—equipped with sound insulated hollow metal doors, of the disappearing type—free throw non-projecting hardware —no adjustments required.

Each door is equipped with 3 point locking contact and for high schools, the keyless type multiple locking method insures safety of garments.

GF Wardrobes save aisle space because of minimum projection of door when in motion.

They insure lasting satisfaction and economy.



Open View of Wardrobe

THE AMERICAN SCHOOL AND UNIVERSITY

THE GENERAL FIREPROOFING CO.

Youngstown, Ohio

BRANCHES

BOSTON—74 Franklin Street
CHICAGO—36 S. State Street
CLEVELAND—1233 Prospect Street
HARTFORD—8 Ford Street
LOS ANGELES—1733-35 So. Los Angeles Street
MINNEAPOLIS—310 N. First Street
NEWARK—17 Academy Street
NEW YORK—500 Fifth Avenue
PHILADELPHIA—1425 Chestnut Street
PITTSBURGH—642 Grant Street
S. LOUIS—610 Arcade Building
SAN FRANCISCO—534 Fourth Street
WASHINGTON—201 Mills Building

Dealers Elsewhere. Write for Name of One Nearest You

PRODUCTS

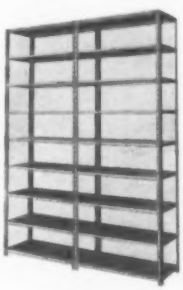
Metal Desks, Filing Cabinets, Tables, Safes, Storage Cabinets, Filing Supplies, Waste Baskets, Storage Shelving, Library Shelving, Aluminum Chairs, Laboratory Tables and Cases, Built-in Metal Wardrobes.

Desks

A full line of steel desks in all sizes and finishes. No warping drawers or splintered edges to ruin stockings. Pleasing Velvoleum tops are easy to write on and easy on the eyes. Never wear rough.

Files

Quiet, easy-rolling drawers of large capacity. Long life, strong and rigid. Drawers never stick shut. Unusual protection to contents. Furnished with lock, if desired.



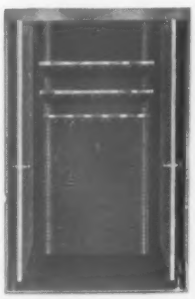
Shelving

Space-saving and enduring. Reduces fire hazard and promotes orderliness in the store room. Optionally reinforced where necessary for varying loads. Can be built fully enclosed with doors and locks.

Wardrobes

Metal Wardrobes in standard units for permanent installation in class rooms.

Steel construction, correctly designed, assures perfect alignment at all times. No warping of doors or door frames. Door swing requires only 3½ inches of aisle space. Adjustable shelves and coat racks.



Library Shelving

A special type of shelving for libraries. Adjustable shelves clean and easily kept free of dust. Illustration shows installation for University of Minnesota.

Storage Cabinets

Clean, orderly localized storage for class rooms, laboratories and work rooms. Finished in pleasing olive green, mahogany or walnut. Locks give full control to custodian.

Complete Catalog on Request

THAYER TELKEE CORPORATION

GENERAL SALES OFFICES
108-114 East 17th Street
Los Angeles, Calif.

GENERAL EASTERN DISTRIBUTOR
P. O. MOORE, INC.
300 Fourth Ave., New York

UNIT H. T.
Open
and
Closed

TelKee Cabinets, equipped with swinging panels, provide the greatest accessibility for ease and efficiency in the control of keys.

The triangular shaped doors open outwardly and when fully extended make a complete spread of 39 inches.

The capacity of these cabinets ranges from 500 to 1,000 hooks, according to the number of panels used. Panels swing in pin and socket bearings, top and bottom. Panels being of uniform size, a cabinet of 500 capacity may be increased in steps of 100 at any time by procuring additional panels at a nominal cost.

This model is also built in a lower height (Unit L. T.) with panels of 50 hook capacity each. Unit L. T. may be built up from 300 to 500 hook capacity as requirements may demand, in steps of 50 hooks.

Three compartments in the base provide space for a 3 x 5 card index for records pertaining to the key system, with two additional compartments to accommodate a supply of markers, receipt holders, etc. A pocket in the door panel carries the loose leaf book index. This unit is designed for use on counter, table or desk or can be attached to a wall. When desired, the special stand, shown in illustration, can be supplied. Cabinet is equipped with key in handle lock.

TELKEE System of Key Control, for many years, has been standard equipment in institutions of every character wherever numerous locks are in use.

TELKEE is used extensively by the United States Government; is also in general use throughout the country in Schools and Colleges.

TELKEE offers many specially designed units for control of keys under any condition of operation.

TELKEE offers to the custodian of keys a simple and efficient system from the standpoint of economical maintenance.

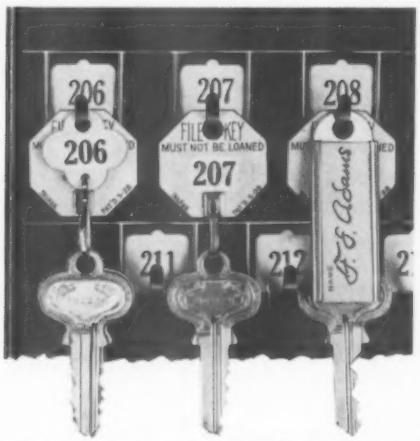
TELKEE VISIBLE KEY CONTROL SYSTEM CABINETS

OPERATING FEATURES OF THE TELKEE SYSTEM

The TelKee System of Key Control provides a method for filing and quick finding of keys in specially designed steel cabinets, with positive and permanent identification of keys, indexed alphabetically and numerically.

One original key to each lock is permanently identified, for use as a "Reserve-Pattern" key, with a TelKee permanent key MarKer which has a patented clasp that locks to the key by pressure of the thumb. The MarKer is die-stamped "File Key—Must not be Loaned" and, with the key, is always preserved on the TelKee File Hook as the pattern key for that lock for use only in emergency or from which duplicates shall be cut.

With the labeled hook and the correspondingly labeled MarKer locked to the "Reserve-Pattern" key, the key identification is complete.



Hook 206—showing Reserve-Pattern Key with permanent MarKer attached, and two unissued duplicate keys with temporary MarKer attached.

Hook 207—showing Reserve-Pattern Key. Duplicate keys have been issued with no receipt taken.

Hook 208—showing Reserve-Pattern Key, together with Receipt Holder carrying complete Receipt Record for the Duplicate keys issued.

The Hook itself has sufficient depth to accommodate five keys.

Duplicate Keys are identified with a TelKee Detachable type MarKer until issued to user as "Active Keys", after which they are replaced by a Receipt Holder with a signed receipt of the borrower.

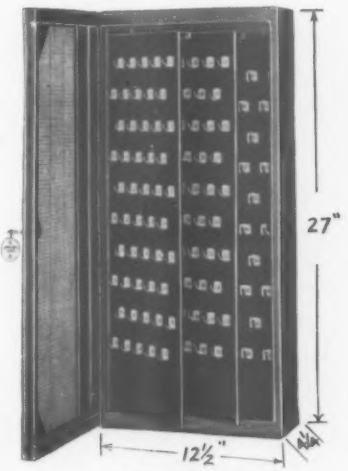
TelKee Visible Filing Units are of furniture steel, conforming with other steel office equipment.

Complete catalogue and samples of MarKers and Index Sheets sent upon request.

WALL CABINET

Compact wall cabinet using standard TelKee panels of 100 hooks each, fifty hooks on the back wall and two swinging panels of 100 hooks each, give a total capacity of 250 hooks.

Cabinet may be had with one panel and the second panel added as future requirements may demand. The inside of cabinet door carries a visible key index sheet.



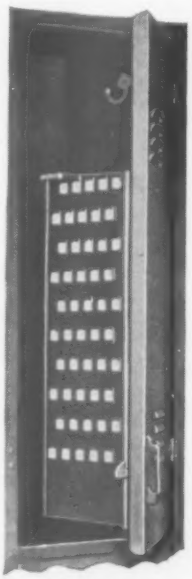
UNIT W. C.

ADAPTOR UNIT FOR LOCKER KEYS

This unit greatly simplifies the maintenance of locker keys and is easily installed by drilling two holes in the door of any standard steel locker. Adaptor plate, bolted to the inside of door, will carry from one to five key panels.

Each panel of 100 hook capacity provides twenty rows of five combination hook and label pockets (ten rows to each side of panel). Panels are instantly adjustable so that units of 100 to 500 hook capacity are available as required. Each hook will carry as many as five keys. Hooks permit clear visibility of labels in serial numbering corresponding to locker numbering.

With the opening of the locker door all keys are accessible on their numbered hooks—and at a touch of the hand the panels close within the locker.



UNIT L. A.

Patented and Manufactured by

Thayer TELKEE *Corporation*

LOS ANGELES, CALIFORNIA

WESTERN ELECTRIC COMPANY

New York, N. Y.

Distributor in the United States

GRAYBAR ELECTRIC COMPANY

Graybar Building, New York, N. Y.

Distributor for Canada and Newfoundland

NORTHERN ELECTRIC COMPANY, LIMITED

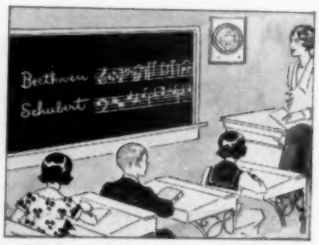
General Sales Offices: 1261 Shearer Street, Montreal, P. Q.

Western Electric

SYSTEMS FOR PUBLIC ADDRESS, MUSIC REPRODUCING, ANNOUNCING AND PROGRAM DISTRIBUTION

General

The Western Electric Public Address and Music Reproducing System amplifies, reproduces, and distributes speech and music to an audience of any size in room or auditorium — or to various parts of a building.



Modern School Systems Find This Equipment Invaluable

Developed by Bell Telephone Laboratories for the Western Electric Co., this system has steadily increased its scope of educational and commercial usefulness.

Men who plan modern school buildings are including this equipment in their specifications.

Public Address and Music Reproducing System

The essential parts of this equipment are:

A Microphone Picks Up the Sound. Several Types Are Available

(1) One or more microphones for "picking up" sound

(2) The Western Electric Reproducer Set, if recorded entertainment is desired

(3) A radio receiver, if radio programs are to be reproduced

(4) "Mixing" and control panels

(5) Amplifying apparatus

(6) Observer's communicating system for auditoriums

(7) Receivers and projectors or loudspeakers

(8) Necessary wiring and circuits

By using microphones and a selective system, school announcements and instructions may be simultaneously delivered to as many classrooms and to as many students as required. In conjunction with the Western Electric Reproducer Set, the Public Address System can be operated with standard laterally-cut phonograph records at low cost. With a receiving unit, radio programs may be reproduced with original effectiveness.

Uses in Schools

1. Transmitting fire drill instructions
2. Conveying a general order to all rooms at once
3. Transmitting music from the auditorium or from a music teacher to one or more rooms as desired
4. Transmitting gymnasium instructor's commands to all rooms at once.
5. Conveying a visitor's, or a special instructor's speech to all parts of the building
6. Receiving and transmitting educational radio programs to all rooms
7. Supplying recorded music from the reproducer for Music Appreciation courses at any time or to any room that fits your schedule
8. Amplifying speaker's voice in auditorium, particularly important for children's weak voices.

This Reproducer Set Is Always Ready to Reproduce a Program of Recorded Entertainment or Instruction

A Public Address System Includes Your Whole School in the Hearing Circle

A Few of the Schools and Colleges Equipped with Western Electric Public Address Systems

East

Yale University, New Haven, Conn.
Rindge Technical High School, Cambridge, Mass.
Worcester Polytechnic Institute, Worcester, Mass.
Dartmouth College, Hanover, N. H.
Wyoming School, Millburn, N. J.
Trenton Senior High School, Trenton, N. J.
Brooklyn Technical High School, Brooklyn, N. Y.
College of the City of New York, New York, N. Y.
Far Rockaway High School, Far Rockaway, N. Y.
Mamaroneck High School, Mamaroneck, N. Y.
Temple Medical College, Philadelphia, Pa.
Pennsylvania Academy of Fine Arts, Chester Springs, Pa.

South

Hope High School, Hope, Ark.
Jeff Davis School, New Orleans, La.
City High School, Bastrop, La.
Vanderbilt University, Nashville, Tenn.
School for Deaf, Austin, Texas
Galveston Junior High School, Galveston, Texas
East End Junior High School, Richmond, Va.

Middle West

University of Illinois, Urbana, Ill.
Proviso Township High School, Maywood, Ill.
Technical High School, Indianapolis, Ind.
Iowa State College, Ames, Iowa
University of Kansas, Lawrence, Kans.
River Rouge High School, River Rouge, Mich.
Ford Trade School, Dearborn, Mich.
American Conservatory of Music, Detroit, Mich.
Robert Fulton School, Minneapolis, Minn.
Hadley Vocational School, St. Louis, Mo.
St. Monica School, Cincinnati, Ohio
James Ford Rhodes High School, Cleveland, Ohio
Webster Junior High School, Oklahoma City, Okla.
Milwaukee Vocational School, Milwaukee, Wis.

Far West

St. Ignatius High School, San Francisco, Calif.
Stanford University, Palo Alto, Calif.
Los Angeles High School, Los Angeles, Calif.
Pasadena Junior College, Pasadena, Calif.
Colorado Agricultural College, Fort Collins, Colo.
University of Washington, Seattle, Wash.
University of Wyoming, Laramie, Wyo.

(For a list of additional installations see pages 244-245, 1933-1934 edition of this yearbook.)

Cost

The cost of a Public Address System installation is relatively small, considered in the light of its variety of uses—and of the profitable returns, direct and indirect, from those uses.

The Western Electric Architect's Specification Bulletin gives complete information on all types of installations and all other data necessary to estimate requirements for any given job. It is available on request to Graybar Electric Co.

Engineering consultation on any problem may be had for the asking.

Developed and perfected by the Bell Telephone Laboratories, the research laboratories of the American Telephone and Telegraph Company and the Western Electric Company, the Public Address and Music Reproducing System has the latest electrical developments as applied to sound transmission. Western Electric workmanship guarantees highest quality and dependability.

Service

Western Electric maintains an emergency stock of repair parts at many strategic locations.

Testing the Hearing of Pupils with Western Electric No. 4-A Audiometer

Audiometers

Poor classwork by students often is caused by defective hearing. Western Electric No. 4-A Audiometer measures acuity of hearing quickly and accurately with the same standard of measurement for all examined. Essentially a phonograph to which telephonic apparatus has been added, sounds produced in the phonograph are transmitted simultaneously to the ears of those under examination.

Listeners record what they hear on specially prepared sheets. An accurate comparison with the original transmitted transcription then is possible. Full information regarding the Audiometer for making individual or group tests may be obtained from the distributors.

Audiphones

For students and others with defective hearing, Western Electric manufactures individual and group hearing aids—Audiphones, using Bone Conduction and Air Conduction Receivers. Three types of individual hearing aids are available to meet the needs of those whose hearing impairment is slight or of an extreme character. Further details about the individual and group Audiphones may be had from the distributors.

ALL-STEEL-EQUIP COMPANY

Incorporated

GENERAL OFFICES AND FACTORY

550 Griffith Avenue, Aurora, Illinois

New York, N. Y., 56-58 West 22nd Street Chicago, Ill., 326 South Jefferson Street

BRANCH AND SALES OFFICES IN PRINCIPAL CITIES

Write for Latest Catalog of School Equipment

PRODUCTS AND COMPANY

Steel lockers, steel book shelving; steel storage, filing and wardrobe cabinets; steel transfer cases, card cabinets, drill cabinets, typewriter tables; steel stacking boxes and shop equipment.

A-S-E has been established over 20 years; is a national concern that has pioneered the development of modern steel equipment.

ENGINEERING SERVICE

A-S-E offers an experienced and intelligent consulting and design service to help provide maximum efficiency in the utilization of available space. Branch offices provide prompt and accurate supervision service.

LOCKERS

A-S-E Lockers are provided in many types and sizes, including: single, double and triple tier, two-person, box, compartment, and golf lockers; key cabinets, basket racks, baskets and special equipment also provided.

(Left)—Type 9000 Single Tier Locker (Section of two)

(Above) — Type 9001 Double Tier Locker (Section of four)

Six-inch sloping tops, extra shelves, special locks, special finishes, closed bases, coat rods, vertical partitions, special ventilation and louvre equipment—available to order.

A-S-E Lockers are made from hot rolled annealed steel, stretcher-leveled. Doors of cold rolled, patent leveled sheets. No notches cut in angle frame for the concealed, practically unbreakable hinges. Body No. 24 gauge steel throughout. Finished in olive green, French grey, school furniture brown. Other colors to order.

In every detail of construction, A-S-E Lockers are ruggedly built to provide years of school use and abuse.

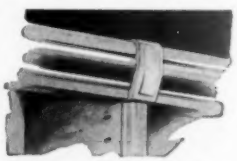
The wide range of types and styles permits virtually every school locker need to be efficiently answered.

PATRICIAN SHELVING

Patrician Shelving in School Library

A particularly distinctive shelving that combines practicalness and flexibility of use with strength and fine appearance. A-S-E Patrician shelving stands out among modern and high class commercial types.

It offers the beauty of fine wood with the advantages of steel. Furnished in a great number of various types for school use.



Cornice, Moulding and Corner Piece—all designed for fine appearance

Unit construction, with all parts interchangeable. Double wall construction in all upright members provides flush ends of shelf openings —leaving no sharp corners.

Molded trim and beautiful cornice at top adds outstanding beauty. Shelves are easily moved. Base is 6-in. high—closed all around for cleanliness.

All parts have baked on enamel coat, then are hand sprayed with two coats of high-grade lacquer. Choice of—olive green, autumn brown. Other flat colors and wood finishes in walnut or mahogany to order.

CABINETS

Two complete lines. "Master" provides the finest construction features known. "Popular" answers need for attractive cabinets at low cost.

In all, 57 models to meet every school need. These include—storage, wardrobe, combination, desk and counter high tabulating card, glass door, etc. Can be recessed in wall.

Made from selected steel with heavy frame. Concealed hinges. Vault type chromium plated handles. Baked enamel base coat with two coats of lacquer. Olive green standard—French grey, white or mahogany or walnut finish to order.

No. 3489 Wardrobe Cabinet

AMERICAN SEATING COMPANY

Makers of Dependable Seating for Schools, Churches and Public Auditoriums

General Offices: Grand Rapids, Michigan

The scope of seating service this company maintains is nationwide, operating through more than fifty accredited school supply houses maintaining catalog service and warehouse stocks in every state or trade area. In addition, twenty-five direct branch offices of the company are maintained in all principal cities, thus placing the buyers in continual personal contact with responsible representatives.

The Posturally Correct American Henderson - Universal Sight-Saving Desk

Our products cover the entire field of public seating including seating for churches, chapels, libraries, lodges, dormitories, theatres, assembly halls, auditoriums, school classroom desks, tables and chairs, tablet arm chairs, steel folding chairs and folding assembly chairs both in all wood and upholstered types, together with upholstered chairs for reception halls and fitting rooms.

Illustrations of three of our standard school seat units most commonly used are shown herewith. Catalog and specifications governing all their products are available to Purchasing Agents, Architects and others interested in seating.

Important facts in pamphlet form pertaining to posture in the classroom resulting from authoritative research under specialists in health, eye protection and classroom efficiency are available to educators without charge upon request. Pamphlets include "Essentials of Hygienic Seating", "The Relation of Posture to Tuberculosis", "Ideals and Standards of Classroom Seating", "Scoliosis and School Seating" and "The Buying of School Equipment". Indicate by title those in which you are particularly interested.

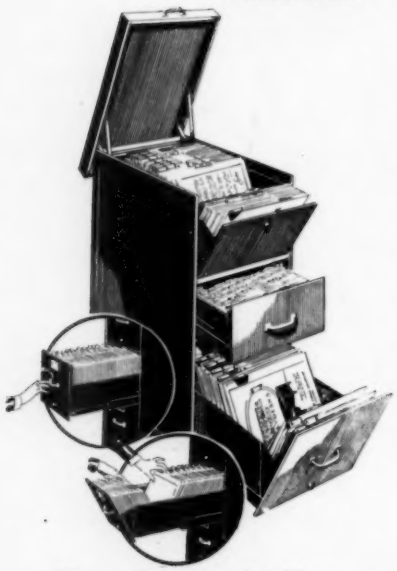
The No. 34 All-Purpose Chair That Folds

The No. 280 Tablet Arm Chair, Posturally Correct and Economical

AUTOMATIC FILE & INDEX COMPANY

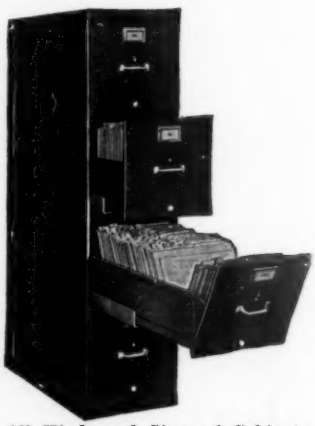
629 W. Washington Blvd. AUTOMATIC FILES · SYSTEMS · DESKS that EXPAND Chicago, Illinois

DRAWERS THAT EXPAND AND COMPRESS AUTOMATICALLY



In Filing Cabinets

Contents held under full compression, all guides and folder tabs clearly visible. Slight pressure exerted at desired point of entry expands drawer (see illustration at left) giving a big "V" nine inches wide at top. Pushing drawer shut automatically compresses material again. No usable capacity sacrificed for working space as in old-fashioned, rigid-drawer files. More material per file—less files—less floor space—less cost per filing inch. (See typical Automatic counter installation on page 238.)



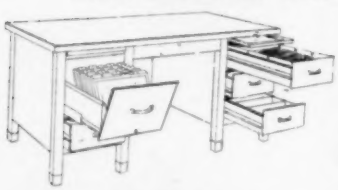
All Kinds and Sizes of Cabinets

In Desks

All large drawers in desks are same expanding type as in Automatic files, described above. Material can be read without removing from drawer as is shown at right. All shallow drawers can be fitted with trays for card index systems or with partitions, either vertical or sloping for stationery. Tray for pins, clips, rubber bands, pencils, etc., in center drawer. All drawers on ball bearings. Locking center drawer locks entire desk. Sturdily constructed of steel. Top covered with battleship linoleum and bronze bound.

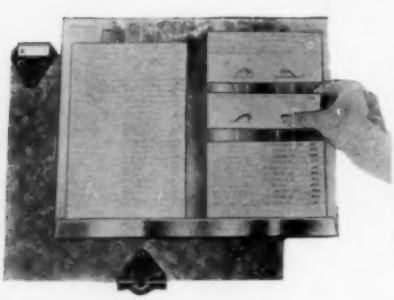
Material Read Right in Desk Drawer

Your Personal File



The Modern Desk
(All Styles)

VANDEX VISIBLE CARD RECORD



Quick reference, accurate, simple, flexible, compact, many sizes of cards, very low cost. Can be put in regular desks and filing cabinets. Submit requirements or sample card for our recommendations.

THE AMERICAN SCHOOL AND UNIVERSITY

THE BERGER MANUFACTURING CO.

Division of Republic Steel Corporation

Canton, Ohio

Two-Person Lockers

BERLOY STEEL EQUIPMENT is manufactured by an organization that **knows** the needs of the modern school and university. Built to meet the most rigid requirements for durability, utility, and structural perfection Berloy Steel Lockers, Cabinets, and Shelving nevertheless can be purchased at prices quoted for the commonplace.

Berloy Steel Equipment possesses unusual beauty of design and finish. All items are quickly available in practically every size and type. Experienced Berloy Engineers will be sent anywhere to assist architects, builders, or purchasing agents in the planning of new installations.

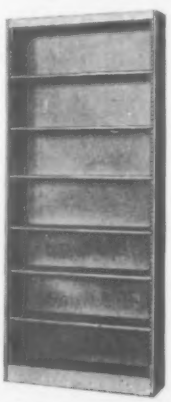
Berger's 50-year reputation for highest quality goods, square dealing, and fair prices insures complete satisfaction.

Filing Cabinets

Teachers' Combination Cabinet

B BERLOY

"First in Locker Values"



Book Shelving

Students' Corridor Single Tier Lockers

Teachers' Combination Wardrobe Lockers

Students' Gymnasium Compartment Lockers

Students' Gymnasium Double Tier Lockers

THE CANTON ART METAL CO.

Manufacturers of

High Grade Sheet Metal Products

Canton, Ohio

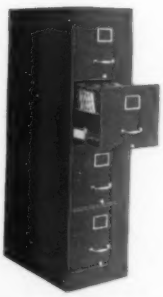
PRODUCTS

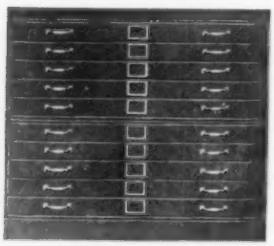
The Canton line of high-grade sheet metal products for schools and offices includes: steel desks, tables, chairs, waste baskets; card files and letter files, both vertical and horizontal; storage cabinets, wardrobes and steel shelving.

Desks are structurally correct, combining medium weight with supports and reinforcements scientifically placed for the greatest strength and service. Style 1654, illustrated here, is 60″ wide, 30½″ high, 34″ deep.

Storage Cabinets, sturdily built and adequately reinforced, provide economical protection for supplies and records. No. 5001, above, has 4 shelves, adjustable on 3″ centers without the use of tools, and is equipped with a paracentric key lock in a modernistic chrome-nickel handle. 36″ x 78″ x 18″.

Vertical Files have the smooth, silent compensating drawer suspension that enables heavily loaded drawers to move in and out effortlessly and noiselessly. We have files for all purposes in all grades, sizes and finishes.





Steel Drawers such as these are easy to use and give long service.

Steel Wastebaskets are finished to harmonize with desks.

Wardrobe Cabinets like No. 5503, above, are of welded construction and equipped with chrome-nickel hardware; finished in olive green. One cabinet will serve a large number of people, providing space for hats, coats and rubbers. Width 36″, height 78″, depth 18″.

Write for illustrated circulars

CHICAGO STAGE LIGHTING CO., INC.

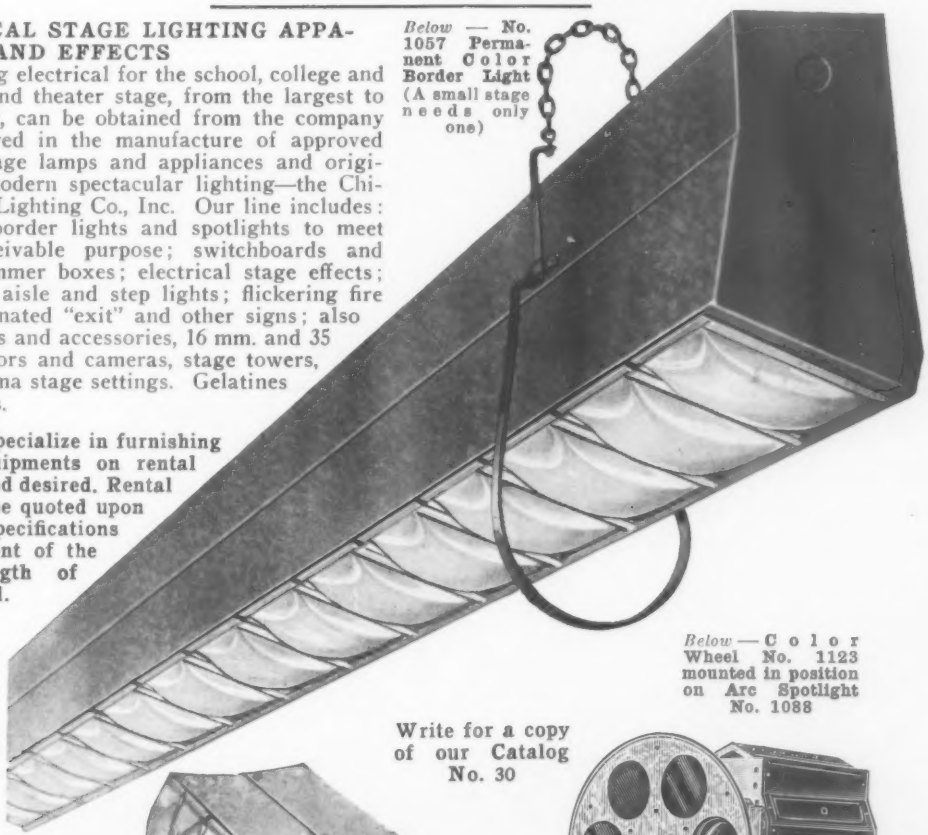
Manufacturers of Electrical Stage Lighting Apparatus and Effects

55 West Wacker Drive, Chicago, Ill.

ELECTRICAL STAGE LIGHTING APPARATUS AND EFFECTS

Everything electrical for the school, college and university and theater stage, from the largest to the smallest, can be obtained from the company that pioneered in the manufacture of approved fireproof stage lamps and appliances and originated the modern spectacular lighting—the Chicago Stage Lighting Co., Inc. Our line includes: footlights, border lights and spotlights to meet every conceivable purpose; switchboards and portable dimmer boxes; electrical stage effects; floodlights; aisle and step lights; flickering fire logs; illuminated "exit" and other signs; also stereopticons and accessories, 16 mm. and 35 mm. projectors and cameras, stage towers, and cyclorama stage settings. Gelatines in all colors.

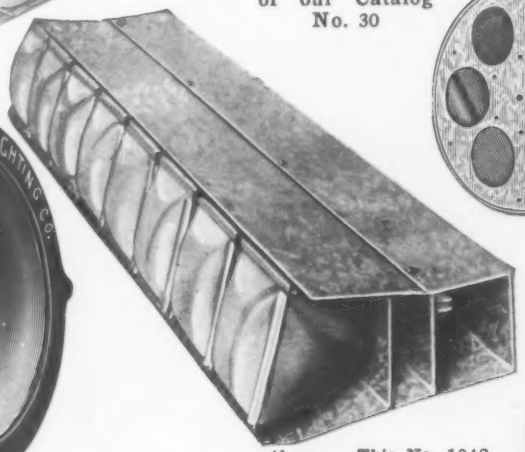
We also specialize in furnishing lighting equipments on rental for any period desired. Rental prices will be quoted upon receipt of specifications and statement of the desired length of rental period.



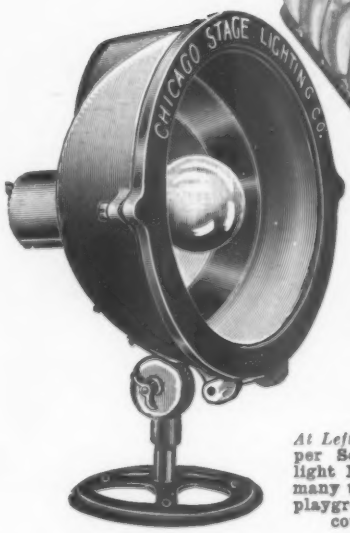
Below — **No. 1057 Permanent Color Border Light (A small stage needs only one)**

Below — **Color Wheel No. 1123 mounted in position on Arc Spotlight No. 1088**

Write for a copy of our Catalog No. 30



Above — **This No. 1042 Permanent Color Footlight has three distinct features—individual reflecting unit, unbreakable colored lens front, and compact construction**



At Left — **This Super Service Floodlight No. 1138 has many uses on stage, playground, tennis courts, etc.**

THE CONRAD & WHITE SCENIC COMPANY

Manufacturers of

THEATRICAL AND SCHOOL STAGE EQUIPMENT

132 South Delaware St., Indianapolis, Ind.

PHONE: LINCOLN 9596 RENTAL SERVICE

SCHOOL STAGE EQUIPMENT

First consult with The Conrad & White Scenic Company, if you are planning the purchase of school stage equipment of any kind. This Company will not only supply you with any needed scenery, stage curtains and curtain tracks, draperies, electrical lighting equipment and lighting effects of various kinds, stage hardware and other stage accessories, but their experience will aid you in the solution of any special problems you may be facing in equipping the stage.

Scenery

We manufacture a complete line of interior and exterior settings, cycloramas, cyclorama doors, tormentors and grand drapes.

Rental

Since it is not ordinarily feasible to purchase scenery for special school or college plays, operas or other performances inasmuch as the type of scenery required varies with each production, we maintain a Rental Department, about which we shall be very glad to send you full particulars.

Stage Curtains

We furnish a complete line of all sizes of stage curtains, to operate on draw track, drape or elevate with counterweight, using velour, damask, sateen, monks cloth and other materials. Also asbestos curtains.

We also supply noiseless hardwood curtain tracks which are easy to install and operate.

Electrical Equipment

Our line of electrical equipment for school stages includes footlights, borderlights, spotlights, floodlights and color effects. Let us send you full details.

Stage Hardware and Other Accessories

Stage hardware and other stage accessories, including stage rigging (both counterweight systems and hemp lines), can be secured from our stocks at all times.

Let us know your needs, and we shall be glad to offer suggestions and quote prices.

CYCLORAMA SETTING BY CONRAD & WHITE SCENIC COMPANY

DICTAPHONE SALES CORPORATION

EDUCATIONAL DIVISION

420 Lexington Avenue, N. Y.

Dictaphone

REG. U.S. PAT. OFF.

DICTAPHONE EQUIPMENT and Courses for Commercial Classes and Speech Improvement:

1. DICTAPHONE BUSINESS PRACTICE: for the Secretarial and Office Practice Courses — an up-to-the-minute course in the transcription of Business Dictation; the equivalent of 50 hours of PRACTICAL BUSINESS EXPERIENCE.

2. DIRECT DICTATION (Dictaphone) TYPEWRITING: a course in which the efficiency of machine dictation, scientifically correlated with the textbook, effects an **economy** in time of 33⅓% and an **increase** in results of 25%.

3. ACCEPTABLE AMERICAN SPEECH: by Mrs. Letitia Raubicheck, Director of Speech Improvement, Board of Education, New York City, and Mrs. Mary Morris Seals, Barnard College, Columbia University. A new, up-to-the-minute course in Speech Improvement, correlated with 20 full size permanent practice records. This course represents the best thinking of the most qualified of experts in speech improvement.

These courses used in conjunction with the new. B-12 Dictaphone Transcribing machine, equipped with "Nuphonic Reproduction" which sets a new standard for voice clarity

Write us for complete information on these three courses.

THE AMERICAN SCHOOL AND UNIVERSITY

EAGLE LOCK CO.

Terryville, Conn.

General Sales Office: 26 Warren Street, New York, N. Y.

BRANCH OFFICES

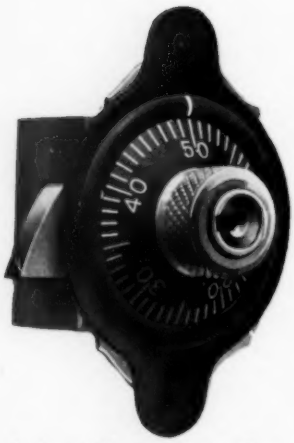
521 Commerce Street
Philadelphia, Pa.

179 No. Franklin Street
Chicago, Ill.

114 Bedford Street
Boston, Mass.

COMBINATION LOCKS

The maximum of economy and security.



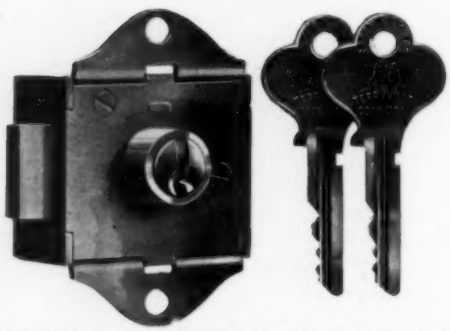
Automatic Locking—Furnished either masterkeyed or not masterkeyed.

Automatic Locking—Furnished either masterkeyed or not masterkeyed.

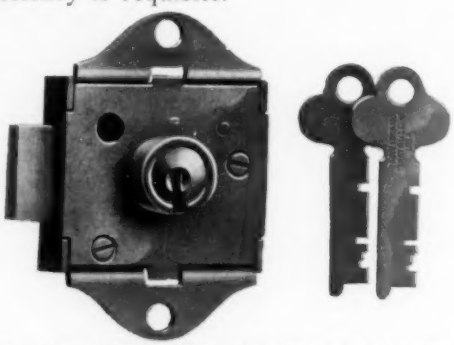
Automatic Locking—Not furnished masterkeyed.

MANUALLY OPERATED KEY LOCKS

For use where greatest efficiency is requisite.



Pin Tumbler Construction—The type of work used in the most excellent grades of locks.



Secure Lever Construction—A type of lock work that has proved its worth in years of service.

Even under difficult space and light conditions the simple and positive operation of inserting and turning a key reduces delay to a minimum.

THE AMERICAN SCHOOL AND UNIVERSITY

THOMAS A. EDISON, INC.

Laboratory and General Offices: Orange, N. J.

Most educators agree that a thorough knowledge of EDIPHONE Voice Writing (dictating) equipment is a necessary part of the modern commercial training!

BUSINESS MEN today insist that their employees know how to operate Ediphone Voice Writing (Dictating) Equipment efficiently—which is one of many reasons why progressive schools specify "Ediphone equipment" for secretarial project use. Students need it, and the Ediphone practice records and Secretarial Text Book save teachers hours of difficult instructing.

In the Secretarial Pro-technic Ediphone a new high standard has been achieved! This latest development of the Thomas A. Edison Laboratories is dust-proof and is completely sanitary. All mechanism is concealed and electrically controlled. Furthermore, the new Pro-technic Ediphone uses Edison's principle of "Balanced" Voice Writing which is new in principle, new in design, new in its life-like tone.

Ediphone equipment is money-saving, time-saving! If you have not investigated its possibilities, TELEPHONE THE EDIPHONE, YOUR CITY, for complete details. Or write direct to Orange, N. J.

Ediphone

The Completely Enclosed Dictating Machine

WORLD-WIDE SERVICE IN ALL PRINCIPAL CITIES

ELECTRO-ACOUSTIC PRODUCTS COMPANY

2131 Bueter Road, Fort Wayne, Indiana, U. S. A.

CENTRALIZED RADIO AND PUBLIC ADDRESS SYSTEMS FOR USE IN EDUCATIONAL INSTITUTIONS

THE latest developments in Centralized Radio and Public Address Systems are now available for use in small, medium or large educational buildings at costs well within prevailing budget limitations.

The newly developed Electro-Acoustic Systems Nos. 1, 1A, 2 and 3, specifically designed and constructed to meet the exacting requirements of educational buildings, are unexcelled for tone qualities, simplicity of operation, versatility and sturdiness of construction.

As indicated in the illustration, unsightly mechanical equipment has been concealed in a well-designed desk that completely houses all control units and power stages, and that will harmonize with any scheme of interior furnishings and decorations.

Everything is self-contained — radio, phonograph, room switch distribution system, control units and amplifiers. Extreme versatility of the distribution system permits relaying of radio and recorded programs as well as announcements to any pre-selected room or group of rooms or to the entire student body. Separate emergency control switch permitting interruption and immediate resumption of scheduled programs that are being relayed to one or more rooms whenever emergency announcements to entire student body are necessary is an exclusive feature. This equipment will lower the cost of school administration while increasing its efficiency.

Discriminating buyers are selecting Electro-Acoustic Systems because of their exceptional fidelity of reproduction and high degree of scientific development. The amplified voice retains all of its individual characteristics and inflections. Musical reproduction is noted for its fidelity to the original, from deepest bass to highest treble.

The excellence of Electro-Acoustic Systems is attested by many notable installations and our unusual guarantee reflects our confidence in their durability and satisfactory performance. The services of our Engineering Department are at your disposal without cost or obligation. Specifications and estimates will be furnished on request.

Open View System No. 2

The most compact central station unit obtainable. Desk is standard height, thus placing switches, microphone and control units within easy reach of operator when seated. Amplifiers are concealed in a special ventilated and insulated compartment. When not in operation, all control units and microphone can be completely covered and locked to prevent tampering by unauthorized persons. A dignified and highly efficient central control station.

Electro Acoustic Systems / SOUND ELECTRICALLY REPRODUCED

ERPI PICTURE CONSULTANTS

INCORPORATED

250 W. 57th St., New York, N. Y.

offers . . . .

9 SERIES OF EDUCATIONAL TALKING PICTURES *as effective* AIDS TO TEACHING

1. **BOTANY:** Eight talking picture subjects revealing life processes and structures of plants, comprising materials otherwise impossible to present.
2. **ZOOLOGY:** Thirteen talking picture subjects presenting zoological material impossible to reproduce in the laboratory through any other medium.
3. **BIOLOGY:** Eighteen talking picture subjects providing pertinent materials to be used in teaching the modern biology course.
4. **PHYSICS AND CHEMISTRY:** Six talking pictures for use in teaching these subjects in senior high schools.
5. **GENERAL SCIENCE:** Twenty talking picture subjects which orient pupils in the fields of science.
6. **TEACHER TRAINING:** Ten talking picture subjects in educational philosophy and methodology.
7. **NATURE STUDY FOR PRIMARY GRADE:** Eleven talking pictures for acquainting primary pupils with the wonders and works of plants and animals.
8. **MUSIC APPRECIATION:** Four talking pictures presenting the choirs of the symphony orchestra with selections from the world's finest music.
9. **PARENT-TEACHER PROGRAMS:** Twelve talking pictures for acquainting parents with modern educational procedures.

Write for further information about these professionally produced talking pictures and accompanying texts for use in your educational program.

Erpi Picture Consultants

THE AMERICAN SCHOOL AND UNIVERSITY

ESTEY ORGAN CORPORATION

Brattleboro, Vermont

What other feature of a college chapel or school auditorium can compare with a rich-toned organ in bringing to the students inspiration and a higher appreciation of esthetic and spiritual values?

As manufacturers of the highest quality organs for eighty-eight years, the Estey Organ Corporation have a reputation for organ-building so well known as to need no further comment on this page. Everywhere churches, university chapels, residences, theaters and concert halls are to be found equipped with the Estey Organ, and recently an ever-increasing number is being sold for college and high school auditorium use.

PIPE ORGANS

For the convenience of those contemplating the purchase of a pipe organ of any size or number of stops, the Estey Organ Corporation has compiled a 100-page illustrated brochure. This is not an organ catalog in the usual sense of the word, because a pipe organ should be built according to individual specifications to suit individual requirements; but the booklet will be found very helpful not only in determining what type and size of organ will best meet your school needs but also in giving any lover of good music an understanding of the general principles of the art of organ building, as well as the distinctive contributions being made to that art by the Estey Organ Corporation.

Illustrated below is an Estey Three Manual Master Console built for the Theodore Roosevelt

High School, New York City. This organ contains the Estey Organist, or automatic player, and visual stop tablet control. The automatic player will play the entire instrument by rolls, controlling notes, registration of stops, operation of the swells and regulation of the tempo. Many of the rolls in the Estey library are recorded by famous organists. They include a wide variety of selections, from arrangements of symphonic works to some of the lighter music of the day. The visual stop control is another recent development of great educational value. Lights of various colors, placed above the stop tablets, designate the tone colors and orchestral instruments as they are brought into use. The students in music appreciation classes, by watching the console, are thereby acquainted with the tone characters brought into use in the rendition of any selection.

REED ORGANS

For the small schoolroom or auditorium, a reed organ such as **Model H** shown above is suggested. It is a well-known fact that a splendid reed organ is far preferable to a cheap or very small pipe organ. The same painstaking workmanship and high grade of materials go into our reed organs as go into our finest pipe organs. **Model H** contains Philharmonic scale reeds, found only in Estey organs, and has a range from the full, rich diapason to the remarkably sweet and delicate tones of the Aeolian harp and flute. This model has a self-contained electric motor. Booklet describing these and other models will be sent on request.

GAYLORD BROS., INC.

Library Furniture and Supplies

Syracuse, New York — Stockton, California

A Complete Line of Library Furniture and Equipment, all manufactured in our own factory by Gaylord craftsmen—Book Shelving, Sectional Card Catalog Cabinets, Dictionary Stands, Display Cases, Magazine Racks, Sectional Charging Desks, Tables, Chairs, Book Trucks, etc.

Write for complete catalog which lists and illustrates hundreds of items for the Library—supplies of all kinds—furniture and equipment. Every item listed is carried in stock both at our Syracuse factory and at our Western Branch in Stockton, California. Prompt shipments are therefore assured, as orders can be quickly filled from either point.

GRANT JR. HIGH SCHOOL LIBRARY, SYRACUSE, NEW YORK

GENERAL ELECTRIC COMPANY

General Office: Schenectady, New York

SALES OFFICES IN PRINCIPAL CITIES

Classroom Eyestrain—Its Heavy Cost

The up-to-date school executive or teacher is becoming increasingly eye-conscious. He is beginning to realize the heavy cost of eyestrain in the classroom. More and more he is appreciating the truth of these facts:

"The sense of sight is by far the most important medium by which pupils learn. In studying, a pupil's eyes take countless visual impressions or images. If the lighting and visual conditions are such that these images are taken rapidly and clearly, a lesson will be learned more quickly, and with less drain upon the child's resources.

"The direct result of this preventable backwardness is an economic waste, both through loss of the pupil's time, with the inevitable discouragement which follows failure, and through the additional expense to the school system.

"When through impaired vision students are deprived of the opportunity to acquire information that would be of use and value to them, or are compelled to spend additional months or years in school in order to repeat work in which they have failed, the individual, the community, and society in general suffer a heavy loss."

The above quotations are from "Standards of School Lighting, with Suggested Requirements for a School Lighting Code," a pamphlet prepared under the joint sponsorship of the Illuminated Engineering Society and the American Institute of Architects which should be in the hands of every school executive and school architect.

G-E PHOTOELECTRIC RELAY, CR7505-D4
For Indoor Light Control

What Are Schools Doing to Prevent Avoidable Eyestrain?

Two main factors are responsible for classroom eyestrain:

1. *Faulty vision.*
2. *Faulty lighting.*

A great majority of the schools in this country are making more or less adequate provision for examining the eyes of the pupils and prescribing glasses, where necessary, to correct faults of vision. But the matter of proper school lighting has been left largely to chance. True, windows have been provided, there has been some attempt to avoid glare by providing window shades, and usually pupils have been seated so as not to face the light. But very little expert attention has been given to providing the correct amount of light, properly diffused and distributed. Certain types of school activities require higher degrees of illumination than certain other types.

Guesswork Eliminated—General Electric Photoelectric Relays

How may a teacher know that the pupils are receiving the proper amount of light at any given time? There are two ways that can be depended upon:

1. *A photoelectric cell may be used to warn the teacher at the moment the illumination becomes insufficient.*
2. *Better yet, a General Electric Photoelectric Relay will actually turn the artificial light on or off, at certain stated foot candle standards.*

Is this General Electric Photoelectric Relay expensive? On the contrary, it is inexpensive, compared with the cost of poor illumination and impaired vision!

Then why are not these General Electric Photoelectric Relays in general use in the schools all over the country? Of course, the answer to this is that the idea is a comparatively new one. But just as electric refrigeration and air conditioning have advanced, and will continue to advance, so this other scientific invention for adding to the pupils' welfare and efficiency has been advancing in this year 1934, and will continue to advance in the years to come.

Write for Information on General Electric Photoelectric Relays

To those school executives or school architects who would be interested in the technical details of G-E Photoelectric Relays, we shall be glad to send a copy of our Booklets GEA 1654B and 1602. Or a G-E representative will be glad to discuss classroom requirements with you, advising the proper type to meet your needs.

GENERAL ELECTRIC X-RAY CORPORATION

2012 Jackson Boulevard
Chicago, Ill., U. S. A.

Victor Interval Timer

Measures Any Interval of Time from 15 Seconds to 2 Hours, and Sounds an Alarm at the Expiration of the Allotted Interval

for Classes in

TYPING
SHORTHAND
DOMESTIC SCIENCE
PHYSICS
CHEMISTRY
GYMNASIUM

—or wherever correct time allotment is an important factor

The Washington School for Secretaries
NATIONAL PRESS BUILDING
WASHINGTON, D. C.

May 1, 1934

General Electric X-Ray Corporation
2012 Jackson Boulevard
Chicago, Illinois

Gentlemen:

In answer to your inquiry with reference to our six years of experience with Interval Timers in our typing classrooms:

1. We employ at present two typing teachers. Without this device, it would require one additional teacher to give the same amount of instruction.

2. In an eight-period day it saves at least two hours of a teacher's time through automatic timing of speed tests.

3. Even if this appliance were priced at $100.00, we would not be without it. At $5.25, it is impossible to understand why any professionally-minded typewriting teacher would not avail herself of its advantages.

Very truly yours,

A. C. Beaver

Director of Studies

ACB:T

IMPROVED MODEL
COSTS ONLY $5.25 Postpaid

FEATURES

Times periods from 15 seconds to 2 hours. Concealed alarm rings when time interval has elapsed . . . Can be set in advance and started when ready by means of a lever . . . Finished in black enamel and chromium, in the modern motif . . . Approximate dimensions—4 x 5 x 2 inches.

THE AMERICAN SCHOOL AND UNIVERSITY

THE GREGG PUBLISHING COMPANY

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Commercial Education Texts and Teacher Aids

Over 600 Titles

Gregg publications cover every branch of commercial education and include over six hundred titles in the subjects of shorthand, typewriting, business correspondence, bookkeeping and accounting, commercial law, general business science, secretarial practice, and similar subjects. There is an up-to-date, authoritative text for every commercial education need of the junior high school, senior high school, evening school, business college, and other intensive classes.

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Rational Bookkeeping and Accounting Series (*Belding and Greene*)	
Elementary Course	$1.50
Advanced Course	1.50
Complete Course	2.00

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Book 2 (Pad form)	.80
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Part I	$1.00
Projects in Business Science, Part I	.60
Part II	1.00
Projects in Business Science, Part II	.60
Part III	1.00
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Parts II and III combined	1.50
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Secretarial Problems (*Haynes*)	.60
Applied Secretarial Practice (*SoRelle and Gregg*)	1.40
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Office Practice—An Integrated Laboratory Project, Parts I and II (*Scholl, Stern, and McNamara*) each part	.80

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Gregg Shorthand Manual (*Gregg*)	$1.50
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Gregg Typing, Techniques and Projects (*SoRelle and Smith*)	
Book I	$1.20
Book II	1.20
Complete Course	1.50
College Course	1.20
Intensive Course	1.00
Learning to Typewrite (*Book*)	2.40
The Psychology of Skill (*Book*)	2.00
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Gregg Service

Each Gregg text is surrounded by a helpful service in the form of practical teaching plans, scientific tests, scales, charts, and other record forms. We shall be glad to extend this service to you and to send you sample copies of our texts for your examination. Address our nearest office.

INTERNATIONAL PROJECTOR CORPORATION

88-96 Gold St., New York, N. Y.

NRA MEMBER U.S. WE DO OUR PART

New Simplex PORTABLE SOUND PROJECTOR

Simplex TRADE MARK REG'D

PORTABLE 35 mm. SOUND PROJECTOR

For over a quarter of a century the products of this company have held an unquestioned outstanding leadership wherever motion pictures are shown and enjoyed. In New York, Chicago, Los Angeles, London, Paris, in all the great cities of the world, Simplex Projectors are used in the largest and finest motion picture theatres and in the isolated portions of the universe where dependability is absolutely indispensable. Governments, the Army and Navy, great commercial organizations, universities, churches and other institutions have used Simplex Projectors exclusively for many years.

Simplex-Acme Sound Projector became an immediate and widespread success, but a very definite demand developed for a more compact, more portable and lower priced sound and visual projector for use in schools, colleges, churches, etc. The new Simplex Portable 35 mm. Sound Projector, has, therefore, been designed and constructed to meet the special needs of a large field and although lower in price than the Simplex-Acme Sound Projector there has been absolutely no sacrifice of quality. We take great satisfaction in giving our friends throughout the world an absolute assurance that in certain highly essential details and for the particular field for which it is intended Simplex Portable Sound Projector is far superior to any other sound and visual projection equipment now on the market.

SOUND PROJECTION

SIMPLEX PORTABLE 35 MM. SOUND PROJECTOR HAS A REMARKABLE TONE QUALITY AND THE VOLUME WILL BE FOUND ADEQUATE TO MEET THE MOST EXACTING REQUIREMENTS OF MODERATE SIZED AUDITORIUMS, SCHOOLS, COLLEGES, CHURCHES, HOTELS, HOSPITALS, STEAMSHIPS AND PUBLIC, PRIVATE AND COMMERCIAL ORGANIZATIONS, ETC.

All operating parts of the sound unit, which are an integral of the projector-mechanism, are made in our own plant with the care and accuracy that has been our standard in the manufacture of professional projectors for many years. Our engineers have given the utmost consideration to the selection of the highest grade sound equipment and accessories for Simplex Portable 35 mm. Sound Projector.

VISUAL PROJECTION

The enjoyment and value of motion pictures are greatly increased by the best possible screen results and visual projection has been our first consideration in the design and construction of Simplex Portable Sound Projector. Mechanism parts are made from carefully selected materials and all intermittent movement parts are hardened and ground with scientific accuracy to insure a rock steady picture, to increase dependability and reduce maintenance cost.

PORTABILITY

The entire projector mechanism, lamphouse, takeup magazine, motor and sound head are enclosed in a carefully constructed, substantially built, but light and compact carrying case. No framing and focusing knobs, switch handles or operating parts project from the case and this makes Simplex Portable Sound Projector easier to carry, especially through narrow passageways.

Simplex Portable 35 mm. Sound Projector gives a positive assurance of splendid tone and adequate volume in addition to a professional standard of visual projection, mechanical efficiency, dependability, ease of operation and simplicity.

PRICES AND FULL DETAILS WILL BE SENT UPON REQUEST

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Schools, universities, and institutions have been using Lyon Steel Lockers, Shelving, Cabinets and Folding Chairs for the past thirty years.

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For Locker rooms, recessed in corridors, classrooms and gymnasiums. Available in a wide variety of styles including single tier, double tier, box lockers, gym type lockers, two-person lockers and double door lockers. All sizes. Send for Catalog No. 233.

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Built in a complete range of sizes and styles to meet every requirement in classroom, study, office, or supply department. Heavily constructed with reinforced door and angle steel frame. Equipment includes vault type handles, three-point locking device with flat key lock. Send for Catalog No. 482.

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Steel benches, tool stands, tool cribs, wire enclosure panels and a wide variety of specialized school shop equipment. Built to give years of service under continual hard use and abuse. Send for Catalog No. 323.

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Steel Folding Chairs

Comfortable, durable, safe, quiet and attractive portable seating. Several types—fully upholstered, semi-upholstered, non-upholstered, with arms, without arms and with steel cane saddle seat. A variety of finishes to harmonize with any interior. Send for Catalog No. 835.

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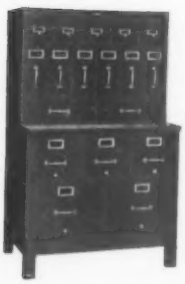

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Miller Line "Photo-Offset" Inked Ribbons

Developed specifically to produce clean, strong copy for photo-reproduction. IN THREE STANDARD INKINGS: Extra Light, Light, Medium. Special inkings to suit any copy requirements.

A VERY ESSENTIAL FEATURE OF PHOTOLITHOGRAPHY

A New Development in Printing Which Interests Instructors

During the past five years, industry and business have been quietly and insistently developing a means for printing quickly and economically—called Photolithography.

It has proved so desirable a means of producing documents and publications in limited quantities—say 200 to 2,000—that schools and universities have become large users. Government officials, particularly County Recorders in the larger counties, use the system widely.

Reduces the expense of printing limited quantities of school papers and small text books.

Use Miller Line "Photo-Offset" Inked Ribbons for Clean, Strong Photolithography Originals—for Reproduction Purposes

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The Miller Line includes both ribbons and carbon papers for taking copies on hectograph machines.

Semi-Inked "Hectograph" Ribbon: Inked on one side only, so that the type of the typewriter does not strike into the ink. This type of ribbon gives a sharp, clean impression, and keeps the type of the typewriter clean.

Full-Inked "Hectograph" Ribbon: Inked on both sides. Suitable for use where the type is very large and will not readily fill, such as Gothic type. Its life is comparatively longer than the life of the Semi-Inked Ribbons.

"Hectograph" Carbon Paper

Eliminates necessity of removing the regular correspondence ribbon from the typewriter, when a hectograph master copy is to be made. Also, more than one hectograph master impression can be made simultaneously from the same copy by the use of more than one hectograph carbon sheet.

Finishes: Intense, Medium, Hard, Noiseless, Clean-Edge.

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For

Rotary Duplicating Machines

For Open Drum, Fountain Feed and Portable Machines—No. 250 and No. 300.

For Closed Drum and Fountain Feed Machines—No. 286 and No. 300.

No. 250. A glycerin base ink. Gives an intense black impression—sharp, cleancut, quick drying, no oily outline. In pound cans for open drum machines. Third-pound cans for portable machines.

No. 300. A bulletin type ink—a bit lighter than No. 250. Also gives a black, cleancut impression—quick drying, no oily outline. Pound cans for open drum machines. Half-pound for closed drum. Third-pound cans for Portable Machines.

No. 286. Made especially for closed drum duplicating machines. Has a thinner base, free flowing and quick drying. Suitable also for fountain cylinders. In half-pound cans.

"The Miller Line is Superfine" — MILLER LINE

A Ribbon for Every Writing Requirement ***A Carbon for Every Copying Condition***

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A Radio Corporation RCA *of America Subsidiary*

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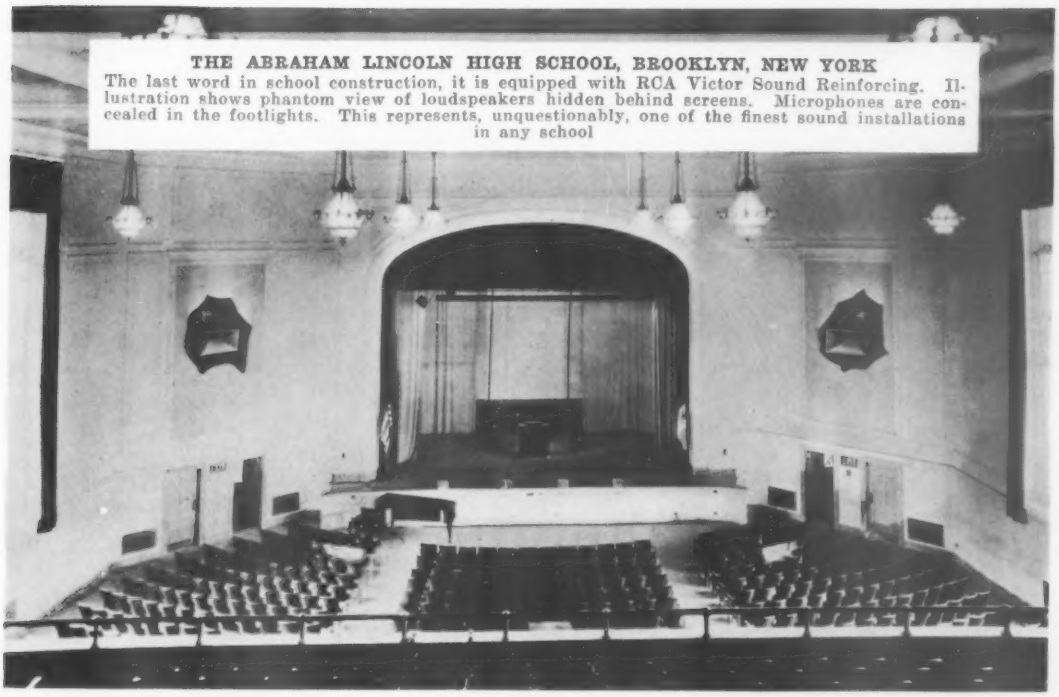

THE ABRAHAM LINCOLN HIGH SCHOOL, BROOKLYN, NEW YORK
The last word in school construction, it is equipped with RCA Victor Sound Reinforcing. Illustration shows phantom view of loudspeakers hidden behind screens. Microphones are concealed in the footlights. This represents, unquestionably, one of the finest sound installations in any school

MODERN EDUCATORS *turn to* RCA VICTOR
for Modern Methods in Group Instruction

The problems raised in group instruction by larger enrollments, more comprehensive curricula, and the need for more centralized control over the ever increasing number of classes, are efficiently and economically solved by the installation of RCA Victor planned Sound Systems. Extremely valuable and widely conceived educational radio programs, and increasing availability of educational sound moving pictures, are putting into the hands of the modern educator new and powerful means of group instruction and recreation. **Write for full details about the following, as well as any special sound equipment you require.**

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1672

ROYAL ZENITH SOUND PROJECTORS, INC.

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Manufacturers of

Imperial

Projectors

A PRACTICAL, STURDY 35 MM. SOUND-ON-FILM PROJECTOR FOR CLASSROOM AND AUDITORIUM

The ideal equipment for your school. Dependable, reliable and easy to operate. Built to last a lifetime. Perfect sound reproduction—a rich, clear natural tone. Projects a brilliant, sharp, steady image on the screen.

The portable may be completely set up ready for showing within ten minutes. Weight only 58 pounds. When packed, it is carried in two small carrying cases.

The permanent Model "A" can be installed easily and quickly.

Write for Full Particulars

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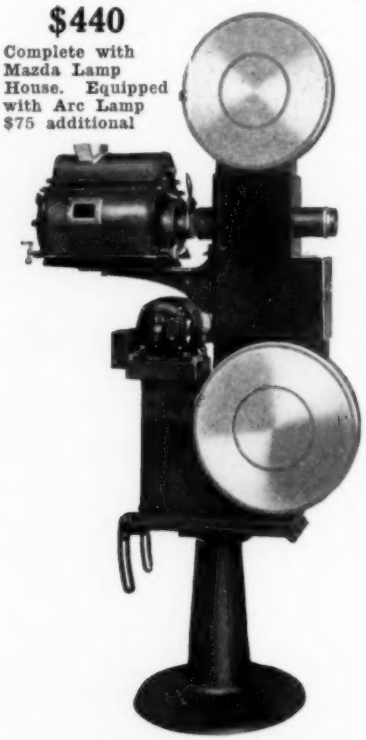
Complete

Equipped with Arc Lamp $75 additional.

Imperial "A"

$440

Complete with Mazda Lamp House. Equipped with Arc Lamp $75 additional



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See and Hear the New *IMPERIAL*

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National Brokers of

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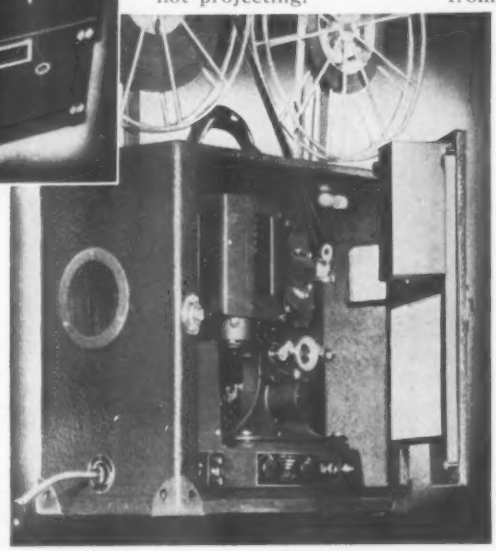
Before making any decisions as to type of projector, stereopticon or other equipment for visual or audio-visual instruction and entertainment in your school, be sure to write for these three little booklets:

VICTOR 16mm Sound-on-Film Animatophones
VICTOR Master 16mm Projectors
VICTOR Portable Stereopticons

These reliable VICTOR products are available for prompt delivery at all times at the national supply house of SUNNY SCHICK, 409 West Washington Street, Fort Wayne, Indiana, National distributors for Victor products—a supply house as reliable and dependable as the products which it sells.

VICTOR 16mm SOUND-ON-FILM ANIMATOPHONE

The Victor ANIMATOPHONE Projector reproduces motion pictures with smooth, natural, full-toned sound that is amazing for its undistorted volume and its crystal clarity . . . without requiring any more skill for operation than is needed for manipulating the dials of any ordinary radio. ANIMATOPHONE is a duo-service, silent-sound equipment. Its 1600-foot reels give 45-minute showings without film changes. The microphone may be attached for use during projection or for public address service while not projecting.



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15 WATT
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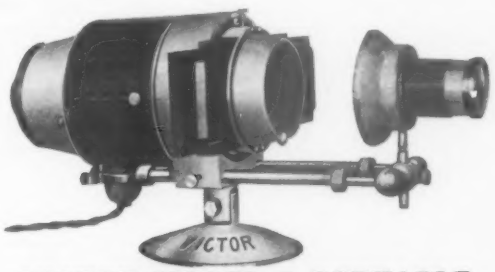
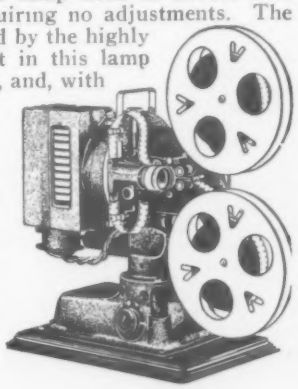


VICTOR MODEL 2 PORTABLE STEREOPTICON

This model is the popular choice of schools. The Mazda-Nitrogen lamp used in Model 2 is permanently set, requiring no adjustments. The illumination produced by the highly concentrated filament in this lamp is intensely powerful, and, with the aid of a perfect mirror reflector, an extremely brilliant and evenly-lighted image is projected on the screen. Lenses are furnished to give any size picture 12 feet wide or smaller, at any distance 10 to 100 feet from the screen.



VICTOR MODEL 10FH PREMIER HI-POWER PROJECTOR

Equipped with the double-strength Hi-Power Optical System and 500-watt, 100-volt Biplane Filament lamp, this model provides maximum illumination, as well as thorough, unfailing film protection and long, satisfactory service. The lamp resistance of the 10FH has a distinct advantage over other types in that it is adjustable in 5 volt steps for any line voltage of from 100 to 120 volts. This eliminates the hazard of burning out the sensitive 100-volt lamps by overloading.

Write for descriptive booklets

THE AMERICAN SCHOOL AND UNIVERSITY

THE SIGHT LIGHT CORPORATION

Chrysler Building, New York

THE SIGHT METER

The remarkable SIGHT METER is known and approved by universally prominent authorities in lighting research and school management. As an instrument to determine and adjust **seeing comfort** it is equal in importance to the thermometer, barometer and thermostat as gauges and regulators of body comfort.

The scale on the SIGHT METER is divided into foot-candles (one foot candle is approximately the intensity of light obtained on a piece of paper held one foot from the flame of a tallow candle). Above the scale appear literal indications of the minimum amounts of light required without eyestrain for the various seeing tasks of everyday school work—with or without artificial light. A child can readily read and understand the SIGHT METER.

The eyes, recognized as the most precious of our possessions, never have had an accurate guide to determine proper seeing conditions; so schools have had no means to intelligently recognize the inadequacy of most artificial lighting and daylighting. It is therefore of utmost importance that the SIGHT METER be used to protect eyesight, conserve energy and improve pupils' ratings. Results are positive.

The levels of illumination prevailing in many schools average less than half of one per cent of the light provided outdoors. The light reflecting on many school desks barely registers on the SIGHT METER.

INADEQUATE FOR CRITICAL SEEING
READING NORMAL PRINT
READING FINE PRINT SEWING ETC
SEVERE VISUAL WORK FOR LONG PERIODS
0 5 10 20 30 40 50
SIGHT METER

The SIGHT METER is four and one-half inches long. Weighs only eight ounces. Built for a lifetime of helpful service

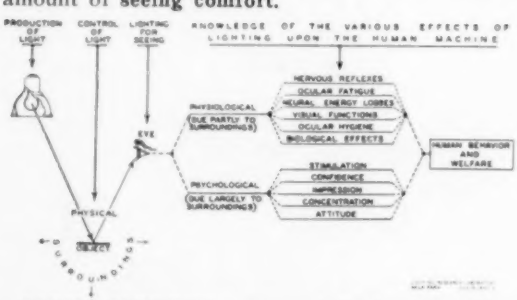
SIGHT METERS SERVE TWO PURPOSES

The SIGHT METER serves two major purposes in the schools:

1. To conserve the eyesight of pupils with its numerous advantages and to remove physiological and psychological abuses due to improper seeing.
2. To enable the teachers to provide just the right amount of lighting in schoolrooms at minimum operating costs.

SIGHT METER PROTECTS YOUR PUPILS' EYES

Lack of concentration, fatigue and apparent dullness in students can be often traced to improper **seeing comfort.** The visual reactions are clearly pictured in the diagram below. The SIGHT METER enables the instructor to check the lighting intensity—both maximum and minimum—to determine and produce the correct amount of **seeing comfort.**



SIGHT METERS are especially important for sight-saving classes where it is necessary to determine the correct amount of light for the pupils' various tasks.

Common deficiencies in lighting in School Libraries are readily gauged and corrected. Proper lighting for Shops, Gyms, Applied Arts and Laboratories can be determined through SIGHT METERS.

A high level of lighting is necessary in crowded classrooms to bring the students in the rear of the room in closer view and to make supervision of study considerably easier. Blackboard lighting can be accurately gauged.

The SIGHT METER exposes inadequate conditions and offers an accurate gauge to produce good seeing condition in classrooms.

USE SIGHT METER TO CONSERVE LIGHTING

The SIGHT METER, while being used to perfect **seeing comfort,** reveals the actual conditions in classroom lighting and acts as an instrument to measure and control true lighting economy.

The SIGHT METER enables the teacher to utilize daylight to its maximum efficiency. For the first time, guesswork can be eliminated in the controlling of window shades and the use of artificial lighting.

The hourly changes in daylighting conditions and the varying quality of the sunlight caused by seasonal and atmospheric changes are quickly gauged by the SIGHT METER. Almost subconsciously, the teacher will learn to obtain the maximum efficiency from daylight by glancing at the SIGHT METER—in about the same manner as a watch or thermometer is used.

The SIGHT METER permits the school management to obtain greater efficiency from existing lighting equipment.

The SIGHT METER enables the superintendent to check and replace worn out or improper bulbs and determine the efficiency of lamp bulbs.

WRITE FOR INTERESTING PAPERS BY SCHOOL AUTHORITIES, ACTUAL CASE HISTORIES AND DATA THAT WILL ENABLE YOU TO PROVIDE, THROUGH THE "SIGHT METER," ADEQUATE "SEEING COMFORT AT MINIMUM COST"

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Buffalo, New York

Manufacturers of

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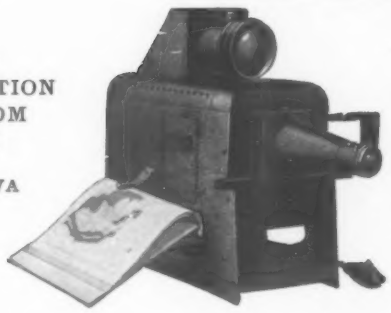
SPENCER COMBINATION CLASSROOM LANTERN

MODEL VA

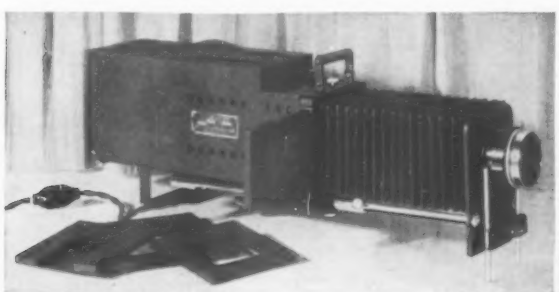


Spencer Model VA is designed for the projection of post-cards, photographs, drawings, etc., interchangeably with glass slides. The change from one to the other is instantaneous. By the addition of a Filmslide Attachment you may also use both filmslides and microscope slides, making this **a four-purpose lantern** at an unusually low price.

The Model V series was built especially to meet classroom conditions; consequently it is compact, portable, easily operated and truly efficient for daily class work. It permits the use of all available illustrations so that the teacher may economically develop his own library.

This model may also be had as an opaque projector only, at a price never before offered for such an outfit. This group is for direct projection on an opaque screen.

Another companion series—Model Y—will accommodate the same types of material but will project all illustrations in their proper position **through a translucent (DAYLIGHT) screen.** Prices are the same for either group.



COLOR PLATE PROJECTORS

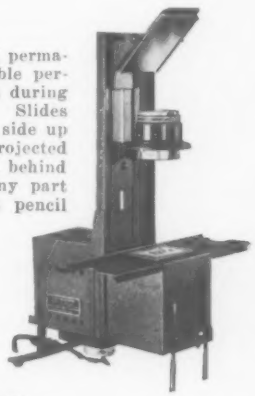
Spencer Model DK was designed especially for protection of natural color plates and other valuable slides.

A motor-driven blower directs a blast of COOL air to the condenser chamber and to the slide, doing away with the objectionable water cell, heat-absorbing glass or other so-called method of eliminating heat.

Model DK is easily portable, simply operated and insures marvelous screen results. Accommodates color plates from 4.5 x 6 cm. up to 3¼″ x 4¼″. An excellent outfit for use in classrooms, small lecture halls and the home.

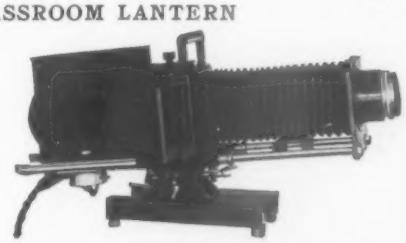
Two larger outfits of this same general design are available for auditorium use and where the larger color plates are used. Model JK accommodates slides up to 4″ x 5″ and the Model LK up to 5″ x 7″.

LECTURE TABLE LANTERN



Spencer Model B—placed permanently on your lecture table permits the use of glass slides during any part of your lecture. Slides are placed on carrier right side up to the lecturer and are projected on a screen hung above and behind him, in plain view from any part of the room. By using a pencil as a pointer it too will be projected, thus indicating to the class the item under discussion. May be used without preliminary set up. Indispensable for class use. The Spencer Model B is efficient and inexpensive.

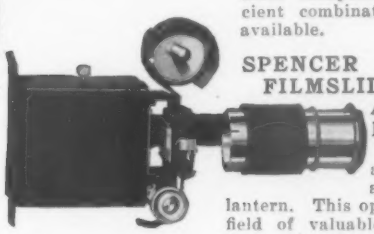
CLASSROOM LANTERN



Spencer Model D for the projection of glass slides in regular class work, embodies several special features incorporated in the design for the convenience of the teacher. It has non-heat conducting carrying handle; **double** tilting device for properly locating screen picture at any desired angle; reading aperture in side of lamphouse; special condensers and lamp insuring remarkably brilliant illumination.

May be used successfully on wall or blackboard as well as screen.

Addition of a Filmslide Attachment gives a three-purpose lantern in one projector. To change from glass to filmslides takes 18 seconds and from filmslides to micro-slides, 5 seconds. This provides the most inexpensive and efficient combination outfit available.



SPENCER FILMSLIDE ATTACHMENTS

May be adapted to any standard lantern. This opens up a new field of valuable educational illustrations from the Spencer Filmslide Library. Filmslides are the cheapest type of illustrative material but are pedagogically and photographically correct.

An exclusive Spencer feature on Filmslide Attachments is the arrangement for accommodating the 3″ x 1″ microscope slides interchangeably with the filmslides at no extra cost.

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STROMBERG-CARLSON SOUND SYSTEMS RADIO--PHONOGRAPH--MICROPHONE

PUBLIC ADDRESS — PROGRAM SERVICE — PAGING

Manufactured under License Arrangements with Electrical Research Products, Inc., Subsidiary of Western Electric Company Incorporated

Sound Systems as manufactured by Stromberg-Carlson are provided in various arrangements, from the moderate priced outfits for small schools to the large "HIGH FIDELITY" Systems for larger institutions. These Systems include radio receivers, phonographs and microphones in various mountings, to connect with loud speakers which may be located in classrooms, assembly halls, gymnasia and outdoor locations such as playgrounds or athletic fields.

No. 4 Program Service School System (Typical Panel)

No. 2 Program Service School System (Typical Panel)

With these Systems an educational institution may provide radio programs to any or all classrooms or to larger groups in assembly halls. It can give recorded programs to the gymnasium for rhythm work in athletics or musical programs to selected rooms. It allows the principal or any person in authority to get in immediate touch with students or instructors by means of the microphone. Assemblies or student groups can be addressed without the usual waste of time caused by congregating in one place.

Public Address Systems reinforce the voice of a speaker in a large auditorium. They provide students with a means of learning to talk over the microphone. They can be connected to central sound systems, so that programs originating on the auditorium stage can be heard in any room supplied by a loud speaker.

Stromberg-Carlson manufacture telephone systems of high quality, for school purposes. Write our nearest branch office for detailed information.

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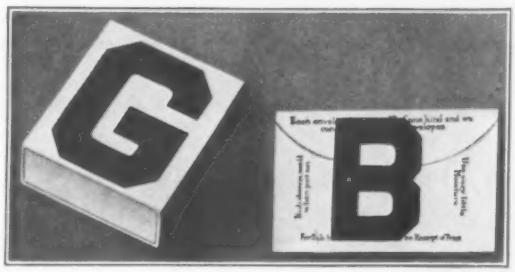
Willson's Gummed Paper Letters, Figures, Symbols and Tape are die-cut from best quality glazed, waterproof, gummed paper. They are easily applied and attractive in appearance.

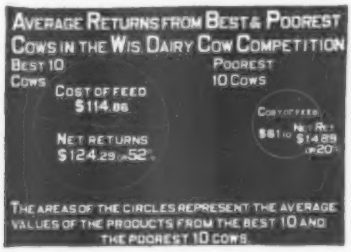


COLORS

Standard stock colors of letters and figures are white, black and red. Symbols and tape carried in white, red, black, blue, green, orange, silver, gold. Special colors cut on order.

STYLES

Three styles of letters and figures are available—Cheltenham, Block, and Gothic. These styles have been standardized because of their legibility and general acceptance as most desirable for display lettering. Sizes from ⅛-inch to 4 inches high.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Willson's Gummed Paper Letters, Figures, Symbols and Tape are especially adapted for making flash cards, analytical charts and graphs, signs, indexes, marking files, records, maps, etc. Used in every type of educational and administrative work.

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Letters and figures are packed 10 of one character to an envelope or 100 of a character to a box. Symbols are packed in boxes of 100 only. Assortments of 1,000, 2,000 or 5,000 characters are the convenient and economical method of purchase, the envelopes and boxes being purchased as refills for the handy assortment boxes as needed.

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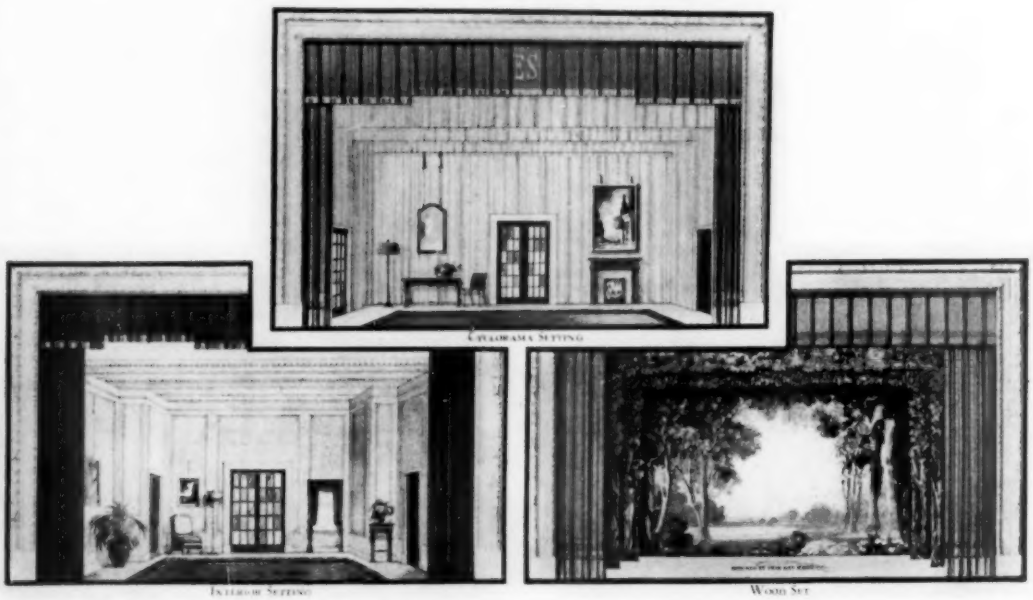

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Stage curtains, auditorium draperies, cyclorama settings, stage electrical equipment, lighting, rigging, hardware and curtain tracks.

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Manufacturers of Peterson Checkroom and Wardrobe Equipment
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PRODUCTS

Peterson All-Steel Checkroom and Wardrobe Equipment for schools, auditoriums, theaters, etc.; consisting of Stationary and Portable Floor and Wall Racks; Overshoe, Umbrella and Baggage Racks; Racks for Gymnasiums; Bathhouse Checkrooms; and Costumers.

THE PETERSON ONE-CHECK CHECKING SYSTEM

Advantages—The Peterson One-Check Checking System increases speed, eliminates errors, and utilizes any given space to provide the greatest capacity. Coats, hats, packages, umbrellas, canes, overshoes, are taken care of quickly and accurately with the least possible expenditure of space or effort.

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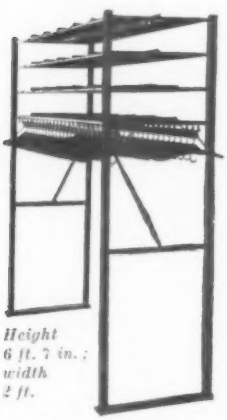


Height 6 ft. 7 in.; width 2 ft.

Floor Rack No. 2

3, 4, 5 and 6-ft. sections which interlock, thereby providing a rack of any required length.

Same applies to all racks. No. 1 Portable—Same as No. 2 with casters added. Wood and Steel panel end to match interior trim can be furnished when desired.

SPECIFICATIONS AND CONSTRUCTION DETAILS

Frames—End and intermediate frames are interchangeable. They are of two-post construction. Posts are No. 18 gauge 1½ in. square tubular steel. Cross arm shelf supports are No. 15 gauge channel-formed steel to receive ends of shelving. Bases—No. 14 gauge 2½ ins. x 1 in. x 2 ft. ¾ in. enclosed top and four sides, with reinforced welded corners. Bases also equipped with vacuum-cup rubber shoes, eliminating necessity for anchoring. All joints electrically welded.

Shelving—New style dust-free perforated and embossed one-piece steel shelving having ⅝ x ¾ x ⅛-in. hard steel angle reinforcement. Also to this is added a ½-in. steel channel for number strips. Hat dividers at 1-ft. intervals embossed into shelving. Hat spacers have rear as well as side divisions. Coat hanger rail supported independent of shelving, thereby causing no undue strain to that portion of rack.

Wall Brackets—Similar in construction to end frames except having No. 3 gauge back supporting member. All connections electrically welded.

Throughout entire construction of all parts, there are no welded joints that will receive a shearing strain.

Capacity—8 coats and 8 hats per lineal foot of floor type rack. 4 coats and 4 hats per lineal foot of wall type rack.

Hangers — One-piece hardwood hanger. No. 10 hard steel rustless wire. Auxiliary hook below.

Numbering — Large, clear, and legible numeral impressed into white fibreloid.

Hardware — All hardware cadmium plated.

Shakeproof washers for all bolted connections.

Finish — Two coats mahogany-walnut brown enamel. Any other color by request.

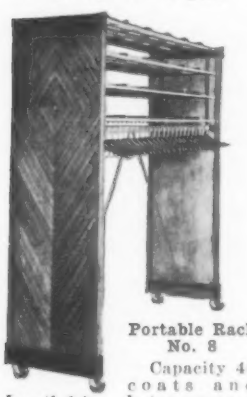
All equipment furnished complete ready for use.

Peterson Checking System is fully protected by U. S. Patent.

Wall Rack No. 3F

Length 3, 4, 5 and 6-ft. sections. Height 6 ft. 7 in.; width at base 1 ft. 6 in. No. 9 portable — Same as above, 6 ft. long with casters.

Wall Rack No. 3 —Made for Anchoring to Wall.



Length 6 ft.; width 2 ft.; height 6 ft. 9 in.

Portable Rack No. 8

Capacity 48 coats and hats; panel ends in walnut, mahogany or oak.

Umbrella Rack No. 4

Height, 36 in.; width, 1 ft.; length, 1 ft. 6 in. and up. Capacity, 16 umbrellas to each 1 ft. length. Drip pan has pet cock for draining.

Overshoe Rack No. 7

Compartments 6 x 6 x 13 in. Standard height 3 ft. 3 in. Any width required. Usually made to fit under counter, or can be used as counter.

GRADE AND HIGH SCHOOLS AS WELL AS MANY OF THE LARGE UNIVERSITIES ARE USERS OF PETERSON CHECKROOM EQUIPMENT

WEBER MACHINE CORPORATION

59 Rutter Street
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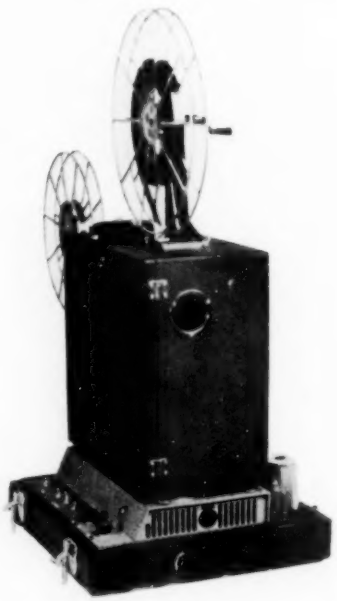
Syncrofilm
SOUND EQUIPMENT

No longer is it a question in the mind of any educator as to the value of sound fiims in schools. All school men know that sound films create a much greater, more lasting impression on pupils' minds than any comparable amount of reading or textbook study. The question today is rather a question of choice: **Which** sound film equipment will produce the clearest films and give the best sound reproduction, at a price sufficiently low as to make it a sensible and economical, as well as worthwhile, investment for the school system?

The Weber Machine Corporation, manufacturers of the famous Syncrofilm products, invite you to investigate their projectors, before making your choice.

SYNCROFILM PORTABLE PROJECTOR

This is a truly portable yet professionally built 35 mm. sound and visual projector for school use. It is equal to standard theater projectors, both in construction and results. The sound reproducing mechanism is an integral part of the projector—not an afterthought or gadget mounted on a projector originally constructed for silent pictures. The entire projector has been designed so as to produce perfect sound pictures, each part carefully planned for the particular function it has to perform, and all assembled into one easily portable unit that can be set up and ready to operate in less than five minutes. The entire mechanism is an aluminum alloy casting, mounted within a solid aluminum case 8½ x 21 x 21".



SYNCROFILM-SIXTEEN PROJECTOR

This 16 mm. projector is the outstanding engineering achievement of our organization during the last year—combining the developments of the last five years of projection and sound engineering. Chief among its many worthwhile features is its unusual simplicity of setup for operation. It is so simple that a student without any knowledge of sound picture technique can operate it successfully. The entire unit is carried in two cases—the projector with case weighing thirty pounds, and the amplifier and speaker in case with cords and reel weighing forty pounds.

Let us send you our illustrated circulars on these two projectors, describing them more fully than space allows us to do on this page.

WEBSTER ELECTRIC COMPANY

Racine, Wisconsin

Manufacturers of

SOUND AMPLIFICATION SYSTEMS

Wherever sound must fill great spaces it will pay you to investigate the precision quality and extremely fine performance of Wesbster Electric equipment. This equipment is notable for its tone fidelity. This is a factor of great importance to school authorities in the selection of an amplifying system. Webster Electric sound amplifying equipment is adaptable to almost every purpose.

The Cabinet type Sound Distribution System, illustrated and described on this page, should be of particular interest because of its fine quality, excellent performance and low price.

It is complete, compact and easy to operate. It is made in three standard models which comprise a central control unit and either 16, 32 or 48 magnetic speakers. The central control unit contains an amplifier, radio receiver, phonograph unit, control board, one complete set of tubes and a desk microphone.

The distribution switches on the control panel permit the principal or operator to control the speaker in each room separately. The power output of this system is ample for from thirty to forty classrooms of ordinary size. The design of this system permits the addition of an extra power stage for larger schools or for future expansion.

For schools not requiring 16, 32 or 48 speakers, a corresponding reduction in price is made.

The speakers supplied with this system are designed to faithfully reproduce all tone frequencies in the voice or music range. Where it is desired to extend the system into auditoriums, gymnasiums or other large rooms, speakers of the Dynamic Cone type may be substituted at a reasonable price.

The control unit as well as the speakers are housed in well designed oak cabinets which will harmonize with the usual school furniture.

The installation of this system is simple and easy. Almost any good electric contractor, radio or public address dealer can install it at low cost.

Complete details regarding this system and its application to any school will be sent upon request. This company will gladly cooperate in the planning and installation.

The Webster Electric Company is also in a position to supply sound amplification systems of the "Rack and Panel" type for large installations either outdoor or indoor. Portable systems for specific purposes are also available.

WESTON ELECTRICAL INSTRUMENT CORP.

601 Frelinghuysen Avenue, Newark, N. J.

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Weston Illumination Control Relay

MODEL 709

—automatically controls classroom lighting

Weston now offers a practical, fool-proof Illumination Control Relay for automatically controlling the lighting in classrooms . . . turning the lights on when needed and turning them off when not needed . . . always keeping the illumination at proper seeing levels.

With this simple device nothing is left to guesswork or chance. In the afternoon, for example, if nature's light should fall below a certain, predetermined level, the lights automatically turn on. Or, during a cloudy morning or storm, if there is insufficient daylight for proper seeing, the lights turn on and keep burning until nature's light is restored to the proper level. Then, lights automatically turn off.

With Model 709, no student need ever suffer from eyestrain or other ill effects caused by inadequate light, for every section of the classroom will have the proper amount of illumination at all times. And lights will never be left burning—needlessly.

The Weston Model 709 Illumination Control Relay is simple to install, requires no attention, and the operating cost is negligible. Some of its other outstanding advantages are listed below. For complete information communicate with the nearest Weston office; or, write for literature.

Outstanding Advantages

1. Light intensity "on" between 10-20 foot candles.
2. Light intensity "off" between 20-30 foot candles.
3. Energy consumed operating—2 watts for 1 minute.
4. Energy consumed not operating—0.
5. Employs lifetime, self-generating Photronic Cell.
6. Cell operates sensitive relays direct—no outside voltage—no amplification.
7. Sensitive Relays operate main circuit direct by small clock motor—no auxiliary relays.
8. Cell can be mounted anywhere desired.
9. Indicating Relay gives constant indication of light intensity in room.
10. Installation simple—maintenance low.

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Insist on Wright-DeCoster units and be assured of the best

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"A Speaker for Every Purpose"

THE YALE & TOWNE MANUFACTURING CO.

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INTRODUCE true economies, maximum security and increased efficiency in locker rooms with these Yale Combination Locker Locks. They supply a degree of protection heretofore unavailable in locks of this type for locker use; security which discourages temptation, aiding in character development. Large easily read dials simplify operation, and minimize congestion and delay in locker rooms.

FOR ALL MAKES AND ALL TYPES OF STEEL LOCKERS

FOR NEW LOCKERS AND FOR REPLACEMENT OF WORN OUT LOCKS ON OLD EQUIPMENT

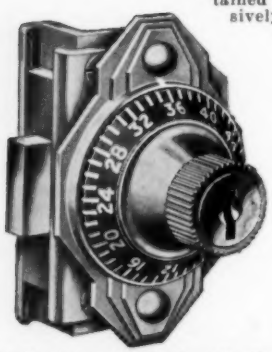
Exclusive Yale Features:

Maximum Security: Combinations dialed on three positive numbers. Combination must be known and cannot be located by manipulating dial.

Combination Disperser automatically upsets combination as lock is locked. A double safeguard. Acts as a defense against tampering.

Combination Changeable with every change of locker occupant—without removing lock from door. Feature secluded in back of lock in same secure manner as in Yale Bank Locks.

Supervisory Control of a group of lockers or the collective groups of a city school system obtained by the **Yale Master-Key Controlled Dial.** The master-key used is assigned exclusively to these locks.



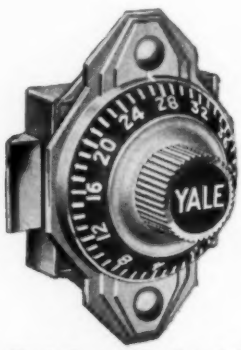
For Lockers with Automatic Bolt Release Mechanism. Automatic Self-Locking Vertical Sliding Bolt. A New Locking Principle.

Master-Key Controlled Dial

No. L3374-CM, Cadmium finish
No. L3374-DZ, Chromium finish

Dial Operated Only

No. L3364-CM, Cadmium finish
No. L3364-DZ, Chromium finish



For Steel Compartment and Box Type Lockers. Beveled Springbolt, Automatic Self-Locking.

Dial Operated Only

No. L3369-CM, Cadmium finish
No. L3369-DZ, Chromium finish

Master-Key Controlled Dial

No. L3379-CM, Cadmium finish
No. L3379-DZ, Chromium finish

For Lockers with Gravity Type Locking Device. Dead Bolt Manually Operated.

Dial Operated Only

No. L3368-CM, Cadmium finish
No. L3368-DZ, Chromium finish

Master-Key Controlled Dial

No. L3378-CM, Cadmium finish
No. L3378-DZ, Chromium finish

NEW YALE COMBINATION PADLOCKS

For Basket Lockers and All Other Types and Makes of Steel Lockers

The finest and most secure combination padlocks yet produced

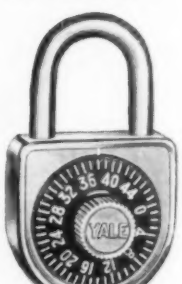
No. 589
Master-Key Controlled Dial

Same features of maximum security and automatic combination dispenser as the above built-in type.

No. 659 Emergency keyway in dial knob provides supervisory control of lockers. May be used with any of the above built-in types. ¼" diameter steel shackle, bolted at both ends (heel and toe) when locked. Combinations unlimited.

No. 429 Dial operated only. A highly secure medium priced padlock. 9/32" diameter steel shackle. Same secure features as No. 659 except Emergency keyway. Combinations unlimited.

Both padlocks have Yale Visible Rotating Dial with forty-eight white graduations and numerals contrastingly indented upon black enamelled dial. Simplified operation. Faster, more accurate dialing.



No. 429
Dial Operated Only

Section VII

CAFETERIA—HOME ECONOMICS—DORMITORY

Beauty and Utility in Food Service: The Public School Cafeteria

BY MARY DE GARMO BRYAN

DEPARTMENT OF INSTITUTION MANAGEMENT, TEACHERS COLLEGE, COLUMBIA UNIVERSITY

CERTAIN rooms in the school plant are of special value because of the contributions they may make to some of the general purposes of the educational system. The cafeteria is one of these. Its function of food service is specific, and it is planned and equipped with this in mind, yet it may also contribute to the social training and development of students and to the cultivation of the appreciation of beauty, which is of fundamental importance to the full development of all individuals.

From one point of view architects, principals, and cafeteria managers are concerned with the factors which affect the utility of the cafeteria as a food service unit; from another, they strive to make this efficient school room a pleasant place. In the accomplishment of both its specific and general functions, utility and beauty may be combined. It is fortunate that the architectural features and the furnishings which make of the cafeteria an attractive and comfortable room also enhance its usefulness.

The factors which must be considered in order to assure the greatest utility of the lunchroom are the fundamental and familiar ones of the geographical location of the school, the style of architecture, the kind of school, the numbers and ages of the children who use the lunchrooms, the length of the lunch period, the type of lunch to be served, the uses of the room, and the amount of money available for building and equipment. These determine the location of the cafeteria in the building, its size and shape, lighting, ventilation, finish, and furnishings.

Location

Utility is the main point of approach in determining the location of the cafeteria. It should be considered from three aspects: the amount of time the room is used; the relation to other rooms; and the accessibility to a delivery entrance. If the room is to be used only as a lunchroom for a period of an hour or an hour and a half a day, it will likely be given a poor location in the building. In some cities cafeterias are located in basements because of their limited use, though this is so unsatisfactory from other standpoints as to be generally avoided. Any room in a school building which is used but one or two periods a day is an extravagance, and there is a trend toward the use of the lunchroom for other purposes when it is not required for the service of food.

Utility also affects the location of the cafeteria in relation to other rooms. In some schools it is a laboratory for certain cookery classes; in others the home economics teacher is also the manager of the cafeteria. In both of these situations it is desirable that the cafeteria be adjacent to or across from other home economics laboratories. If used as a study room, it should not be too far removed from the classrooms.

It is most important to locate the lunchroom near locker rooms and toilet rooms. It should be possible for the students to place their books in their lockers before going to the cafeteria. Piles of books on tables are unsightly and space-consuming.

Too much emphasis cannot be given to the desirability of making adequate provision for the washing of hands before eating. If washrooms are not easily accessible, this sanitary habit will not be established. Nor are three or four wash-bowls sufficient. Students are not apt to wait in line to wash their hands. Washrooms containing adequate and suitable fixtures should be located on corridors leading to the cafeteria. Considerable ingenuity has been shown in some schools in the arrangement and adaptation of fixtures. Large circular basins in which water is sprayed from a central tower are used successfully, or troughs, back to back, running the length of the room and equipped with spray heads or perforated pipe make it possible for numbers of students to wash their hands quickly at one time. Faucets should be operated preferably with a foot control, or water may run constantly during the time the line is passing through the washroom. Liquid soap dispensers supplied from a central tank are satisfactory. Paper towels should always be provided.

Accessibility to the playground is frequently considered a convenience in elementary schools.

Close proximity to a delivery entrance through which supplies may be received and waste removed is essential. First-floor location is especially convenient and is probably selected by most architects for this reason. A location on the top floor, which is excellent from the standpoint of light and ventilation, is satisfactory in a large school only if a freight elevator is provided. Supplies for a small cafeteria may be carried up by hand.

In some cities of southern California where large space is available and funds permit, the cafeteria is located outside the main school building. In parts of the South where artificial ventilation is not used, some principals prefer that the cafeteria be located on the top floor, usually the second, in order that the odors of cooking may not spread through the building.

Size and Shape of the Room

Overcrowding in the lunchroom causes discomfort, limits the variety of foods which may be served, and prevents the full use of the lunch period for social training. It is therefore essential that a seat be provided for each student who eats in the room. The number of seats required depends upon the number of lunch periods and the number who eat during each period. The length of the period is also a factor. In short periods all children must eat at approximately the same time. In a long period some children may come in after others have finished. The proximity to their homes and to other eating places affects the numbers remaining at school if the lunch period is "open." If students are required to remain at school during the noon hour, all students in the school must be seated in the cafeteria during the allotted number of lunch periods. It is general practice in these schools to estimate the required seating capacity of the lunchroom by dividing the seating capacity of the school by the number of lunch periods. An allowance of 10 square feet per seat is adequate, though a 12-foot allowance is considered by some architects to permit a more comfortable seating arrangement.

The shape of the room has an important bearing on the efficiency of the food service. A long, narrow room usually requires a long counter with an extra number of persons to serve, if the counter is placed lengthwise of the room. Congestion of students going to and from the counter results from placing the counter across the end of such a room. Tables can be placed to better advantage if the room is not too narrow. A rectangular room of good proportions—not too long in proportion to the width—is apt to be most efficient from the standpoint of service and most pleasing in appearance. A rectangular kitchen placed on the long axis of the lunchroom is most convenient for service.

Except in some basement locations the height of ceilings used in the classrooms is usually ample for ventilation. In some cases where the room is lighted by skylights or used as an auditorium the additional height is especially effective in giving beauty of proportion to the room.

Lighting

The development of lighting standards has done much to increase the utility of the cafeteria and to improve the appearance of the room. If it is apt to be used for classroom purposes—and good lighting helps to make this feasible—the window space should be that of classrooms, or approximately 20 per cent of the floor area. An intensity of 12 to 15 foot-candles is considered good practice in the artificial lighting of lunchrooms. This intensity makes it possible to use the room for classroom purposes, for lunches for night school students, and for school and community social affairs which are held in the evening. Some basement or ground floor locations make it necessary to use artificial light at all times. Under these circumstances good lighting is especially important. Food looks much more attractive in a good light than in a dim one. The atmosphere of a well-lighted cafeteria is pleasing, and the room is easily kept in a clean and sanitary condition.

An intensity of 12 to 15 foot-candles may be obtained under ordinary conditions by using 2.2 to 2.6 watts per square foot of floor area in enclosing globe units placed not less than 10 feet above the floor and suitably spaced. Lighting fixtures lend themselves especially to successful modern designs. The straight lines and stainless materials make it possible to select suitable, easily cleaned fixtures which are a great addition to the decorative plan of the lunchroom. They offer a pleasing departure from the stereotyped classroom fixture.

Ventilation

The ventilation of the cafeteria is one of the most important factors in determining the attractiveness of the room, yet the location and arrangement of many lunchrooms indicate that insufficient consideration is given to this fact. A poorly ventilated room will be undesirable space for lunchroom or additional uses, and cooking odors will spread from it throughout the building.

If the room is artificially ventilated, the same standards should be maintained as for other classrooms. This is sometimes difficult in basement lunchrooms with inside kitchens. Kitchen ventilation over the cooking unit should provide for the suction of air through the hood at the rate of 75 cubic feet per minute per linear foot of hood.

If natural ventilation is to be successful, a cross-draft must be provided in the kitchen, and it is desirable in the lunchroom. Only locations above the basement floor permit of satisfactory natural ventilation.

Rapid developments in methods of air condi-

tioning make it seem likely that such systems will be adapted to general school use within the next few years.

CAFETERIA IN THE UNIVERSITY CITY (MO.) HIGH SCHOOL
Sound-deadening material is used in the ceiling of this room

Sound-Proofing and Sound-Deadening

The elimination of noise is to a great extent a triumph of modern treatment of walls and ceilings. Nothing adds more to the charm of the room or more definitely enhances its use for social development of the students. Sound-proofing and sound-deadening materials of great variety are available, and the type suited to the location and construction of the cafeteria is selected by the architect. Sound-proofing may be used only between kitchen and lunchroom or around dishwashing space. This will prevent much of the kitchen noise from entering the lunchroom. Certain other uses of the lunchroom, such as that of a music room for band practice, may make it necessary to soundproof walls, and even floor and ceiling. Sound-deadening materials in tile, strip, or plaster forms fit easily into any decorative scheme for the room.

Walls

The decorative treatment of walls adds much to the beauty of the room. Plasters are tinted before being put on the walls, or plain plaster walls may be painted. Colors are gay and attractive and should be chosen with the orientation of the room in mind. In some schools the students in art classes decorate the walls with painted panels. In others, certain sections of the wall have cork board panels for the temporary hanging of posters and paintings.

Wainscoting serves to protect the walls where they are apt to become soiled and where tables and chairs may injure the plaster. Wood paneling is attractive with certain styles of architecture. Wide flooring which may be stained and waxed is sometimes used for this purpose. Non-lustrous tiles may be selected for wainscoting when the architecture permits. These are available in almost unlimited variety of color and design.

One of the most satisfactory materials for wainscoting is linoleum. Tones of red, green, and brown, and some blues, are especially attractive; plain colors are more effective than designs. A trimming band of stainless steel, aluminum, or bakelite, or a studding of nails with decorative heads is used as a finish. Linoleum is easily cleaned, is not readily damaged, and tends to deaden noise in the room. If it is not possible to afford any wainscoting, the wall should be painted a dark color to the ordinary wainscoting height in order to prevent soiling or at least to make such soiling less noticeable. Some of the new lacquer points are lovely in color and give a fine hard finish which is easily cleaned.

Photographs by courtesy of Armstrong Cork Co., Lancaster, Pa.

IN HORACE MANN JUNIOR HIGH SCHOOL, BEVERLY HILLS, CALIF.
The wood floor is covered with linoleum cemented over deadening felt. In the picture above, linoleum is cemented to the concrete floor.

The most striking and charming wall treatments may be secured by the use of draperies. These are of a great range of color, material and design. Sometimes casement cloths, light mohairs, or theatrical gauze are hung as glass curtains. More frequently, gay prints or cretonnes, or cottons in interesting weaves in solid colors which pro-

vide a contrast to walls, are used to develop some suitable color scheme. Excellent designs for the draperies are frequently prepared by the classes in decorative arts.

Venetian blinds are decorative and durable and are to be preferred to other types of shades.

Floors

The type of flooring selected depends on the style of architecture and the other uses of the room. Tiles are durable and beautiful. Browns, greens, and reds are good, and in some instances squares of black and white or brown and cream are suited to the treatment of the room. Colors used in wainscoting are frequently carried out in floors. Tiles are a most satisfactory flooring material if a hard floor is desired, and are less expensive than terrazzo.

Cement floors are not satisfactory. They are ugly and difficult to clean. A topping of colored hardener is preferable to plain cement, if it is impossible to arrange for any other type of flooring.

With hard floorings it is necessary to provide large silence domes for chairs and tables in order to lessen noise of scraping chairs. Sound-deadening of ceiling and possibly of walls is especially important if hard floors are used.

Hardwood floors, intermediate between hard floorings and resilient types, are coming into use again for lunchrooms. This is probably due to the fact that these rooms are frequently used for dancing at school and community social gatherings and for classrooms, and wood floors are especially suited to such uses. Wood floors which are properly kept are beautiful and satisfactory. The actual daily care is probably less than for other types of flooring, but the proper preliminary treatment with good penetrating sealers is essential. Unless such treatment is given, and repeated at such intervals as the use of the floor demands, the wood floors will be unsightly and should be avoided for use as floor materials.

Three types of resilient floorings are frequently used to good effect as regards appearance and utility—linoleum, rubber-tile, and the so-called asphalt tiles. These may be selected in squares of contrasting colors—one of which is the same as that used in the wainscoting in plain colors—or in interesting designs. If care is used in cleaning, and if they are properly laid on perfectly dry cement, these floorings will be durable. They reduce noise and are pleasing in appearance.

Furnishings

The floors, walls and lighting of the cafeteria are the most important factors in making it an attractive room, but the furniture does much to enhance or detract from its beauty. The primary requisite of the furniture is that it be strong, easily kept in good condition, and suited to its uses, but it should also be of type and design which give a good appearance and harmonize with the general architectural style of the room.

Chairs are preferable to stools. They are apt to be sturdier and they permit of more relaxation during the meal. They should be of a posture type, especially if the room is used as a study room for certain periods. The back should be high enough to offer proper support, though it may be low enough to slide under the edge of the table when not in use. Many simple designs are available which are more satisfactory than the bentwood type so frequently used in older buildings. The height should be suited to the age of the children. In some schools in which both elementary and high school children use the lunchroom, chairs of suitable heights for both groups should be provided.

Unless the students are required to place their books in lockers before coming to the cafeteria—and in large buildings it is sometimes not possible for them to go to their lockers and then to the cafeteria without shortening too much the time for eating their lunches—a shelf for books should be built on each chair. If this shelf is placed eight or ten inches below the seat, there is sufficient space between it and the seat for books, and it is high enough from the floor to permit the routine sweeping of the floor between lunch periods without moving the chair. As suggested above, all chairs should be equipped with glides to minimize the noise of moving them about.

A wide variety of tables permits of a selection for both beauty and utility. As in the case of chairs, they should be strongly built with straight, simple legs. It seems to be increasingly common to use smaller tables and to combine several sizes and perhaps several shapes in the same cafeteria. The emphasis now placed on the importance of the lunch hour for training in social behavior has largely eliminated the very long tables which make general conversation impossible. Tables seating six are frequently found in the new cafeterias, with possibly a few tables seating eight, and a number seating four. The size will be determined to some extent by the size and shape of the room and by the other uses of the room. If several different sizes are used, there may be more flexible arrangement for the various uses of the room, and the appearance is more interesting. Any combination of tables may be made. For instance, the long tables may be combined for the head table at the football banquet. Small tables may be reserved for seniors; the round tables may be specially adapted to small committee meetings. Such flexibility is also desirable for various community gatherings.

The finish of both tables and chairs should harmonize with the style of the room and with the color of the walls, curtains, and floors. Finishes in dark tones show wear less readily, but there are many new durable paints in gay, charm-

ing colors which may do much to brighten a dark or dull room and to refurnish old furniture which is still strong but has a forlorn and bedraggled look. The surface should be washable, and should not spot with water or hot dishes. Sometimes a finish for the table tops of hot linseed oil and wax, or of the oil alone, is best suited to the room. Such a finish is of good appearance and extremely practical.

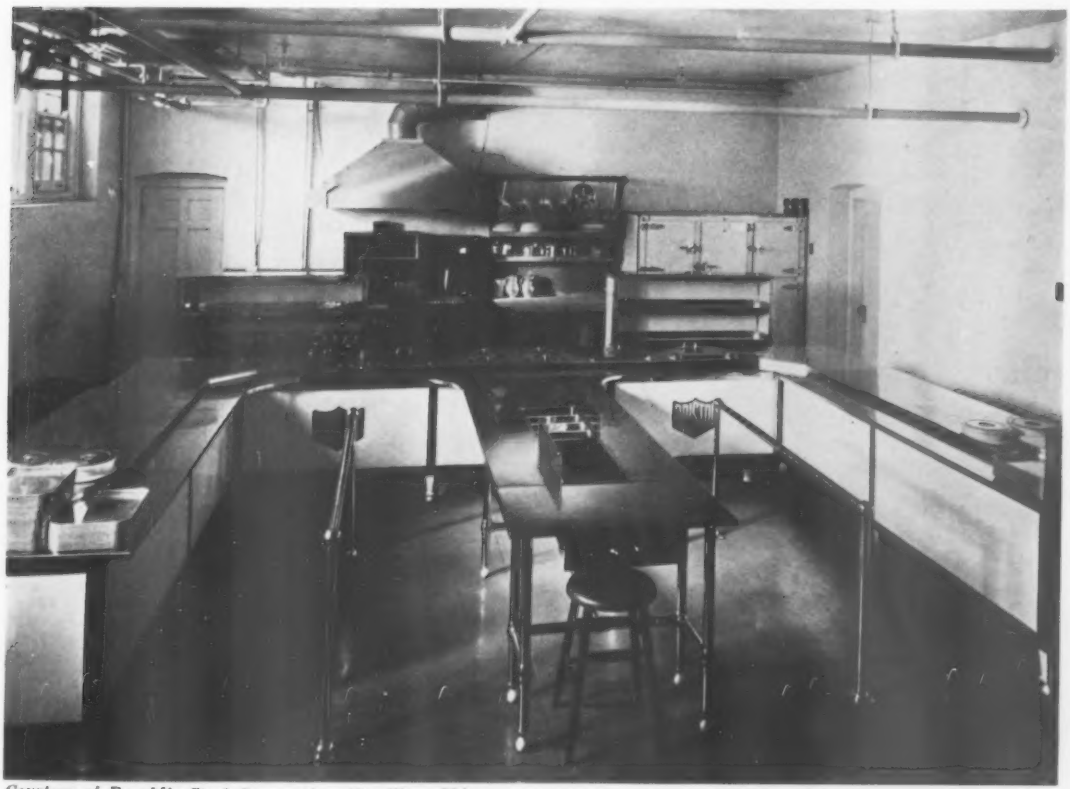
The use of resilient material for table tops eliminates much of the noise of trays and dishes. A number of such materials are used in commercial restaurants with good effect, but the original cost of many of them does not warrant their use in a one-meal-a-day food service. Linoleum, however, is one which is frequently used on table tops in school lunchrooms. It is bound on with a bakelite, aluminum, or stainless steel strip at the edge. Reds and greens, and some browns, are the most satisfactory colors, and the color should be chosen with the color scheme of the room in mind. Some beautiful effects are secured by using linoleum wainscoting and table tops of the same or harmonizing colors which in turn appear in the tiles or design of the floor covering. If the tops are varnished and lightly waxed, the appearance is improved and the upkeep is made easier.

The most striking new tables for school cafeteria use are of metal with linoleum-covered tops. The metal is finished in black, brown or dark green. Tops are of red or green with stainless steel strips at the edge. Designs are simple and effective. They are not appreciably heavier than sturdy tables of wood.

Stationary tables anchored to the floor by iron pedestals or iron frames and with the stools attached are rarely used in the more recently built cafeterias. They limit the numbers which can be seated at one time, since tables cannot be added when necessity arises. In some lunchrooms equipped with tables and stools of this type, children are forced to stand between the tables, holding their lunches in their hands. Rearrangement of tables to suit specific needs and the use of the room for other purposes are difficult to accomplish.

Tables, like chairs, should be equipped with glides.

Table decorations such as plants and flowers in season are frequently brought by the children, or provided by the nature study classes. Pottery and wooden figures made by art classes add to the attractive appearance of the tables when flowers and plants are not available. Every opportunity to decorate the tables for special occasions, such as Hallowe'en and Washington's Birthday, should be used by the manager.



Courtesy of Republic Steel Corporation, Massillon, Ohio

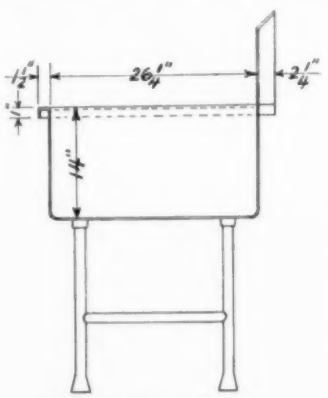
A COMBINATION OF PREPARATION AND SERVICE IN THE SAME ROOM
The Bristol School cafeteria, Webster Groves, Mo.

The Service Counter

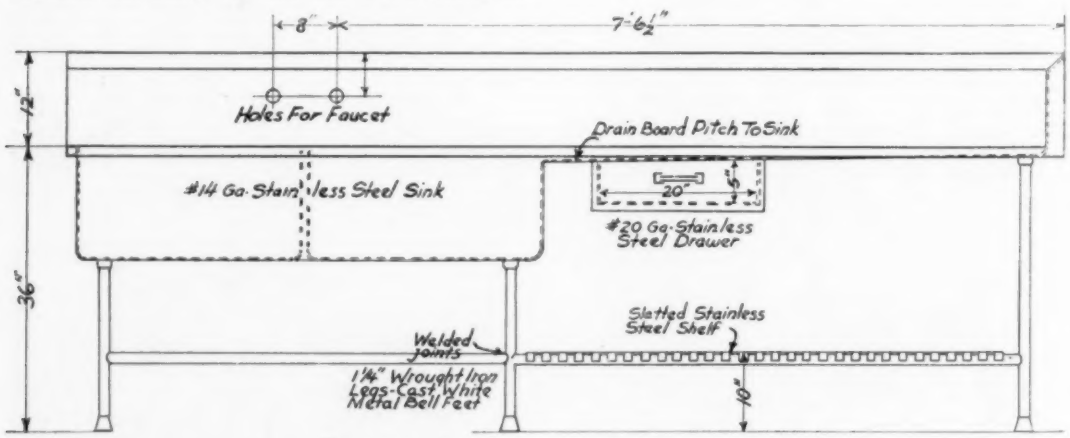
Another important item in the furnishings from the standpoints of both beauty and utility is the service counter. Lack of proper cooperation of all the persons concerned with the planning and management of the cafeteria and coordination with class periods and other school programs, results in the poor equipment of many lunchrooms. Unfortunately for the taxpayer, this usually amounts to "over-equipment." It is especially noticeable in counters. For example, in one school the counter is so large that all the children eating during a 50-minute lunch period pass it in 5 minutes. This is due to the multiplication of service units involving unnecessary expense of installation and operation. In others, the hot and cold portions of the counter are evidently designed without any consideration of the menu and the quantities of each item likely to be served. Long cold counters are frequently provided on which will appear only a few salads selected by the teachers. Visits to cafeterias show many instances of steam escaping from unused openings in the hot table, and some of the openings which are used are so large that the server is tempted to permit the food in them to "steam over" from one lunch period to another. Batteries of urns are installed for the preparation of coffee for a limited number of teachers for whom a fresher product could be prepared in inexpensive portable pots. Installed under counters are refrigerators which are never used. Similar illustrations of poor planning could be given almost without limit. All of them could have been avoided by a knowledge of the actual service problem.

The factors to be considered in the construction of the counter are common to all the furnishings and equipment. First among these is the length of time the item is to be used. If a cafeteria is being equipped or refurnished in an old building and will likely be used but a few years, an inexpensive counter should be selected. Even wood counters, or wood with linoleum-covered top, if strongly built, finished with an impervious varnish, and kept scrupulously clean, may meet certain short-time needs with satisfaction. On the other hand, it would be most uneconomical to buy such a counter for permanent installation in any school which is to be used for a long period of years.

The number of children to be served in a given time is the second factor determining the size and construction of the counter. Twenty to 25 minutes should be allowed for the eating of the lunch. The counter should be large enough to complete the service of all the children at such a rate as to allow this length of time before the end of the lunch period. The rate of service is connected closely with a third point—that of the types of food to be served and the amounts of each apt to be required during the service period. One is of little value without the other. If the former is considered alone, the counter is apt to be unsuitable as to size, and poorly arranged for service. The types and amounts of food will in



SECTION THRU SINK



FRONT ELEVATION

Drawing by courtesy of The Stearnes Company

VEGETABLE SINK AND WORK TABLE FOR CAFETERIA

THIS CAFETERIA IN THE DWIGHT MORROW HIGH SCHOOL IN ENGLEWOOD, N. J., SERVES AT BOTH STUDY TIME AND LUNCH TIME, AS SHOWN IN THESE TWO PHOTOGRAPHS FROM OPPOSITE ENDS OF THE ROOM

turn be determined by the money the children have to spend, and by the results of the persistent educational efforts of teachers, cafeteria manager and parents in training for the selection of suitable food.

There are no standard figures as to length of counters which are suited to all cafeterias, though standard cafeteria plans and counter arrangements for the high and elementary schools have been developed by the school architects in some cities and these prove satisfactory in their particular situations. The type of menu and the number of items each child chooses determine the rate at which they pass the counter. Recent studies, however, have shown that children can pass the entire length of a 20-foot counter selecting a simple hot plate, dessert, and beverage at the rate of 12-15 per minute. If the counter rail is broken so that one dish may be selected at a time, the service rate at any one section may be double the above figures.

In general, the trend is toward the use of shorter counters than were used formerly. Hot units are considerably shortened in new installations. This is due largely to the simplification of the menu by limiting the number of hot foods served each day. A smaller number of openings are required. Even when large numbers of hot plate lunches are served, openings are not increased, but the fresh hot food is supplied at more frequent intervals. If several vegetables are served on a combination lunch, they are arranged in rows in one large shallow pan to facilitate serving, and incidentally to decrease service space. The number of openings is exactly determined by the menu. For example, one well is provided for soup, another for cocoa—if it is served frequently when soup is also served—or for some vegetable such as mashed potatoes or rice. A smaller container for gravy is usually located between these, slightly to the side. One large meat pan may be planned to hold two inside pans, one to contain the meat or meat substitute, the other a vegetable. This speeds the service, especially since most cafeterias are featuring the combination at a price advantage. If an additional vegetable or casserole dish, or choice of meat, or both, are to be served, the required openings may be a pan, or a well, or both. It is an advantage to have a shelf over the counter to carry several hot plates which may be served in advance. Some managers prefer to have for this purpose a space alongside the containers covered with a solid top, or a solid top for covering any unused openings. Much space for this purpose is not required, since a good worker can serve the plates as rapidly as the children can pass the unit.

Shallow pans are used for most foods. The service containers are frequently the same pans in which the food is cooked, since the use of stainless steel for these pans has made them attractive serving dishes as well. Containers for wells are of stainless steel or aluminum with the alumilite finish. These are also shallow, few except those used for soup and cocoa being more than about 7 inches in depth.

New methods of heating the hot unit are arousing much interest. The steam table has long been regarded as a necessary evil. It requires a number of connections, it is difficult to keep clean, and in some climates it is necessary to make additional provision for a boiler for this steam during certain months of the school year. Electrically heated hot units are without doubt the ideal type for the school cafeteria. Such units have been installed in some of the large new schools. Their original cost is still prohibitive for the smaller schools, but several manufacturers are interested in this field and may ultimately provide less expensive units for simpler needs.

The cold unit is usually made up of a counter for sandwiches and for milk and other cold beverages, with glass display shelves for salads and desserts, and of the ice-cream cabinet. Refrigeration is required only in the cabinet. The counter may be readily supplied with cold foods if the refrigerator is located just back of this section. This refrigerator may open from one side into the kitchen and from the other into the cafeteria. Milk is ordinarily delivered just before the lunch period begins and is served immediately. If delivered early, the containers must be placed in the refrigerator. Dairies will usually provide refrigerated cabinets if refrigerator space is inadequate, or the containers may be put into ice pans with double bottoms which are placed on the counters. The shortness of the service period does not warrant the installation of refrigerated pans for this purpose. Most cities require that milk be sold in the containers in which it is processed. In view of experience in emergency feeding in some of the large cities in recent years, it seems likely that bulk milk can be used with safety if proper precautions are observed. Service in bottles or paper containers is the best and simplest method for older children, but children in elementary schools frequently drink a little less than the amount contained in the bottles and there is some waste. The matter of the increased cost due to bottling is also a most important factor in many cafeterias. It may therefore be desirable to arrange for the service of bulk milk from an urn or from pitchers, and space will have to be allowed for this on the cold counter. Any such provisions should meet with the approval of the board of health.

Space for trays, silver, and napkins must be allowed at the entrance to the counter, and at the end of the counter arrangement must be made for the machine or machines used by the cashier.

The shape of the room or the plan of placing the counter in the kitchen area or an alcove rather than in the cafeteria itself determines the shape of the counter. Compact counters are usually easier to supervise and require fewer workers. They are frequently arranged as three sides of a square or as two right angles so placed that one

arm of each angle runs parallel to an arm of the other.

The whole counter should be strongly constructed and well braced. The top should be of stainless steel. If located in the lunchroom, the front of the counter is of stainless steel, enameled steel, wood, linoleum, or tile, and is in keeping with the style and decoration of the cafeteria. In many new schools the counter is placed between the dining room and kitchen or actually in the kitchen. Architects are using ingenious arrangements of alcoves or of sliding or rolling doors so that the counter is frequently not visible from the cafeteria at all or only during the service period. In that event, the front of the counter is usually of enameled steel.

PORTABLE TABLE USED IN THE QUANTITY COOKERY LABORATORY, COLLEGE OF HOME ECONOMICS, CORNELL UNIVERSITY

Making the Service Attractive

The use of attractive china and glass is the most obvious method of adding beauty to the food service. China must first of all be a good vitrified ware, of medium hotel weight. A rolled edge may or may not be used. This type of edge is apt to prevent chipping from the under side but adds an appearance of clumsiness. Several manufacturers are making a flatter rolled edge which is somewhat less heavy in appearance. Sizes should be carefully selected on the basis of the food to be served and the sizes of portions, and should be limited. The 8⅛-inch and 7⅛-inch sizes are commonly used. Newer designs in plates have narrow rims. A smaller sized plate of this design may hold as much as larger plates with wider rims.

Decorations are unlimited in type and variety. They may be simple line, print, or decalcomania, according to the preferences of the buyer. The color and type of the design should tie in with the decorations, and if there is a decided style to the room the design should be appropriate. It is advisable to buy open stock patterns. Ivory or tinted bodies improve the appearance of food and are therefore preferable to white.

Cooking china is now available in charming colors. Most of these are preferable for casseroles, bean pots and custard cups to the ugly brown and green colors previously used.

Glass may also be gay and colorful and practical as well. A good quality of lime glass, clear, and free from imperfections, should be selected. Colored glass costs little more than the plain. Children and workers are apt to be more careful in handling it, and breakage is actually lower than with the uncolored. Stems of sherbet glasses should be short and sturdy. Blown-glass tumblers with some one of the protective features, such as non-nickable edges, and a bulge to prevent slipping, are usually selected. Some designs in pressed tumblers are also pleasing. Glassware should always be selected in hotel weight, and sizes should be standardized and limited as to number. For example, a 12-ounce tumbler may be used for all beverages, while a 10-ounce size suitable for water would require the purchase of a larger size for iced beverages.

Silver is an item which is frequently neglected as far as its contribution to the appearance of the tray is concerned. Complaints are made that the losses are too great to warrant buying anything but the cheapest possible tableware. This very shortly means the shabbiest possible tableware. If it is impossible to prevent or control

Photographs by courtesy of S. Blickman, Weehawken, N. J.

TABLE WITH TILTING BINS, PART OF THE EQUIPMENT OF THE CAFETERIA BAKERY, COLLEGE OF HOME ECONOMICS, CORNELL UNIVERSITY

loss by any of the common restaurant practices, the position is tenable. In other instances, a hotel plate on a nickel-silver base should be chosen. Because of the comparatively limited use to which the ware is subjected, a half or three-quarters plate will show good service. Designs should be simple and easily cleaned by hand. Paper, or nickel or chromium-plated spoons are frequently used, even though knives and forks are of a good plated ware.

Trays are also important in their effect on the appearance of the service, but they are selected primarily for utility. A 13″ x 15″ tray is satisfactory as to size. Aluminum trays with alumilite finish are the most widely used in school cafeterias. They are durable, easily cleaned, and inexpensive. A noiseless tray of a rubber product is now in use in commercial cafeterias. If it proves practicable and durable it may be considered for school use, since its price is not excessive and it assists in reducing the noise in the cafeteria. Other noiseless trays usually of heat-hardened resins have proved too expensive for school service.

The Kitchen Equipment

Beauty and utility in food service cannot be dismissed without some attention to the marked advance in both of these features in kitchen equipment. The use of stainless steel in tables, sinks and dishwashing machines; of chromium plating on slicers and choppers; of durable and attractive enamel finishes on peelers, mixers, shelves, and cabinets, make the kitchen a place of beauty which may well be open to the students during the service period. These features together with modern methods of manufacture and fabrication make machines and fabricated equipment durable, beautiful, and easy to keep immaculately clean.

Here, as in the cafeteria proper, each item must be selected with its use fully in mind. Many kitchens are over-equipped owing to the assumption that all the children eating in the lunchroom will purchase food prepared in the kitchen. This is rarely the case. The recent study of a number of large city high schools showed that an average of 60 per cent of the children eating in the dining room purchased some hot dish, sandwich, or dessert prepared in the school. Though the students were required to stay in the school during the lunch period, the remaining 40 per cent purchased only milk, ice cream, candy, or cakes which were bought ready to sell as a supplement, in most instances, to lunches brought from home. This figure was reached by intensive educational work throughout the school, and the featuring of low-priced food. Comparison with other schools and some city averages for all schools shows it to be better than many. For this reason the number of children for whom food will be prepared should be carefully estimated before any equipment is purchased. It is always easy to add equipment as it is required, but it is a poor use of public funds to tie them up in any items of equipment which are not needed. These items require care, and too frequently they become outmoded before they are used.

The quality of the kitchen equipment, like that of the lunchroom, depends on the service life expected of it. The fabricated equipment such as tables and sinks may properly be made of inexpensive materials—for example, wood for tables and galvanized steel for sinks—if they are to be used but a few years. The tables and sinks of a new school, on the other hand, should be expected to last indefinitely. The newer methods of fabrication and the extensive use of stainless steel make possible tables and sinks which are beautiful to look at, easy to clean, and very durable. The tops of the new tables are usually of 14 gage stainless steel with edges turned down and corners welded. Sinks are of 14 gage stainless steel with all vertical and horizontal corners rounded. The entire fixture is welded seamless in one piece. Such construction insures cleanliness and strength. For school use the legs of tables and sinks are of 1¼-inch steel or wrought iron pipe painted with aluminum bronze. These pipe stands may also be welded seamless in one piece or rail fittings may be used.

The trend in machines is toward the selection of the smallest machine which will do the required work in the time available. This is particularly important in the school cafeteria, since it is used for such limited periods daily. The vegetable peeler for potatoes, carrots, and onions is rarely larger than a 15-20-pound size. Mixers are selected with the idea of preparing foods, such as mashed potatoes, at the rate at which they can be served. Dishwashing machines of small sizes are used, except in cafeterias, in which all dishwashing is done by students and must therefore be done in a short period of time. Even in these instances there is considerable doubt as to whether dishwashing costs would not be lower if regular employees operating a smaller machine were substituted for student workers.

Certain architectural features of the kitchen which make for beauty and utility are similar to those of the lunchroom. Lighting should be excellent. Natural lighting should be equal to that of classrooms, and artificial lighting should provide 12-15 foot-candles on the main working surfaces. Floors should be impervious and easy to clean. Quarry tile is still the best kitchen flooring. Plaster walls should have a wainscoting of linoleum or of tile. Ceramic tiles are effective and more satisfactory than the glazed wall tiles. The walls are frequently made of hollow tile or cinder block with one surface glazed. This is inexpensive, easily cleaned, and pleasing in appearance as well. Sound-deadening treatment of ceilings is especially desirable. Good ventilation is essential. It is usually possible to provide excellent cross ventilation, otherwise adequate mechanical provisions must be made through the flue connected with the hood over the cooking unit.

The Use of Electricity in Household Management, as Taught at the University of Tennessee

BY ELOISE DAVISON

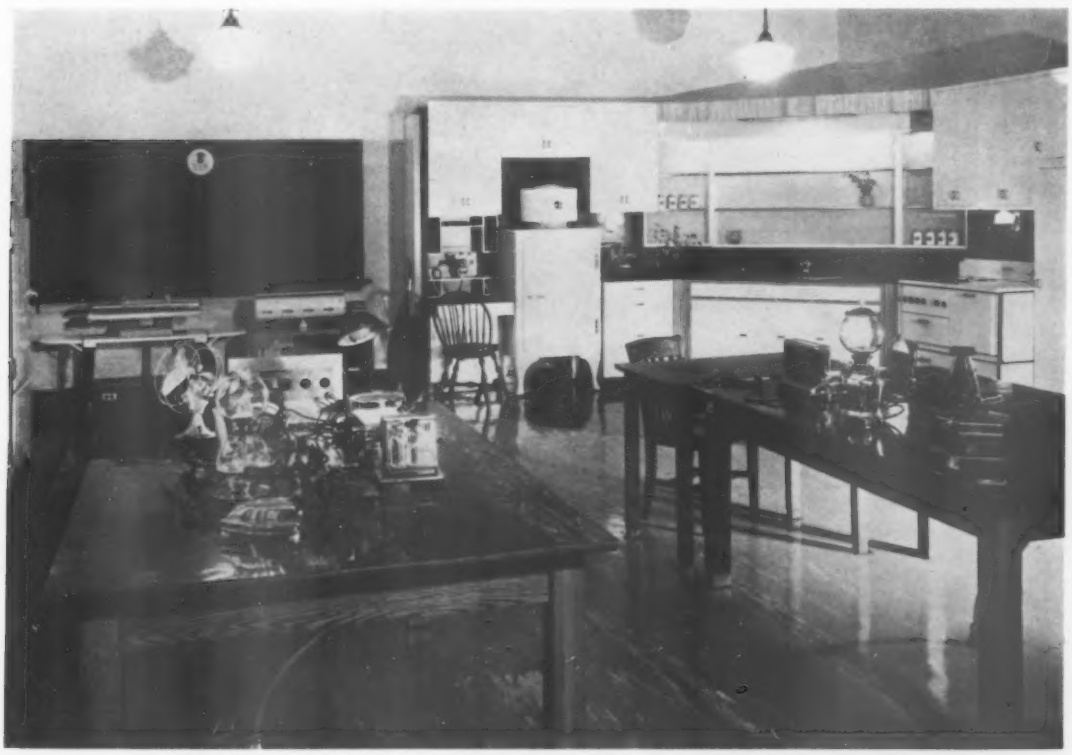
DIRECTOR, DOMESTIC ELECTRIC SERVICE, ELECTRIC HOME AND FARM AUTHORITY

THE large number of graduate students in home economics at the University of Tennessee prompts considerable expansion in the units added to the course of study for both graduate and undergraduate credit each year. As the University is located in the heart of the Tennessee Valley where electric power plays an increasingly important part in the development of the region, a timely and forward-looking addition to the curriculum the past year was a course which concerned itself with a study of electricity and electrical household equipment.

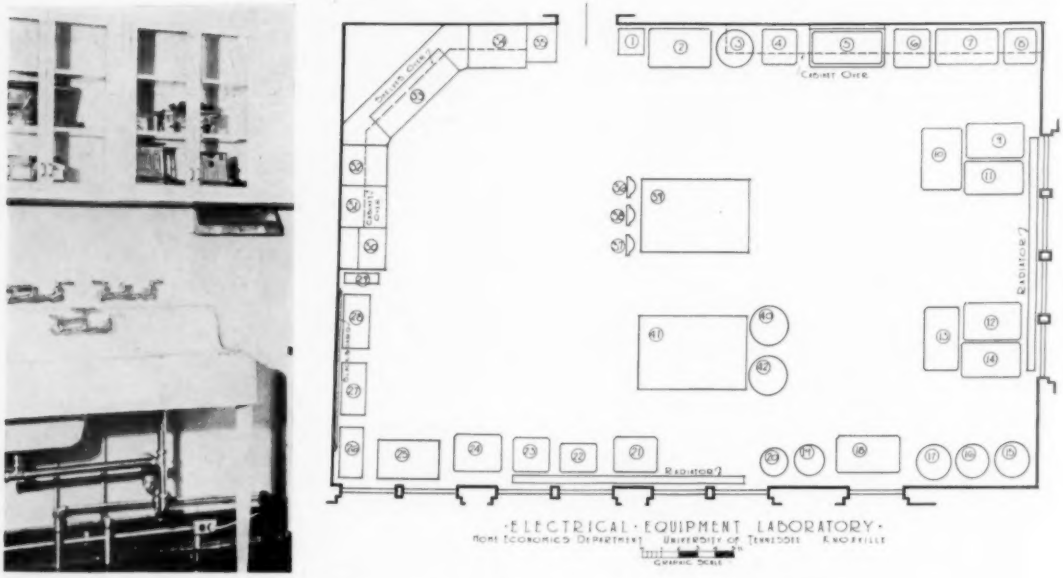
This course proved to be popular, for it was planned to acquaint grade, high school and vocational teachers, supervisors and directors of home economics, and others having similar interests (such as home demonstration agents, teachers of adult education classes, and consumers) with the relation of electricity to better management of household processes. Even those who had been graduated in home economics recently, in spite of their excellent training in foods and nutrition, textiles and clothing, management, chemistry, etc., seemed to feel the need of definite information on electricity to pass on to those in their communities who wish to avail themselves of cheap power and to invest wisely in electrical household equipment.

The addition of this course precipitated the need for a special laboratory, which was planned and executed to accommodate a class of twenty to thirty students. Miss Jessie W. Harris, Director of the Home Economics Department, University of Tennessee, considers the laboratory one of the finest in any school. It was made possible by cooperation of the University, appliance manufacturers and the Electric Home and Farm Authority, a Federal agency which is stimulating the use of electricity in the home. This agency wired the laboratory and assisted in planning the course of study.

The laboratory is housed on the first floor of the Home Economics Building. The rectangular laboratory room is 24 feet by 36 feet. The flooring



THE ELECTRICAL EQUIPMENT LABORATORY AT THE UNIVERSITY OF TENNESSEE
Note the wired tables which are connected to floor outlets; also the installed kitchen which serves as a background for demonstrations



LOCATION OF THE UNITS IN THE ELECTRICAL EQUIPMENT LABORATORY

Water cooler, 1; refrigerators, 2, 21, 22, 23, 24, 31; washing machines, 3, 40, 42; dish washers, 4, 6, 33; sink, 5; combination range and refrigerator, 7; water heaters, 8, 15, 16, 17, 19, 20; electric ranges, 9, 10, 11, 12, 13, 14, 18, 34; kitchen table, 25; ironers, 26, 27, 28; electric heater, 29; planning desk, 30; cabinet with drawers, 32; cabinet, 35; vacuum cleaners, 36, 37, 38; demonstration tables, 39, 41

Small electrical equipment is stored in the cases with the glass doors, shown in the photograph at left above. The faucets at the sink are connected to a series of electric water heaters

of marbleized rubber, in Spanish tile and black flecked with white, meets the demands both of practical laboratory requirements and of appearance. The walls are done in harmonizing tints.

A GROUP OF HOME ECONOMIC STUDENTS AT THE UNIVERSITY OF TENNESSEE STUDYING ELECTRICITY AND ELECTRICAL HOUSEHOLD EQUIPMENT

Practically a hundred household appliances, from electric mixers to washing machines, afford students training in the actual use, under home conditions, of modern electrical equipment of the latest design. The needs of families of varying sizes, and homes of varying incomes, were considered in the study of this equipment.

A large part of the success of this course was dependent upon the facilities provided by a laboratory planned especially for this work. Those taking the course actually worked with the equipment—learned to do by doing. A few classes were given over to demonstrations by guest demonstrators.

The electrical demand of the laboratory was such that a new transformer for the Home Economics Building had to be provided at the outset. The wiring specifications provided heavy-duty outlets of sufficient capacity to allow seven ranges and six water heaters to be connected at one time. These outlets were carefully located with respect to their convenience in use. Two of them were waterproof floor outlets to which wired tables especially designed for laboratory use were attached. These tables were

used for class studies with small electrical equipment. In addition, a number of duplex outlets were carefully located throughout the room, to which refrigerators, washers, dish washers, ironers, and other more or less stationary equipment could be conveniently attached. Some of the duplex outlets were mounted on the baseboard, and some were located at a height of 36 inches from the floor.

Demonstrations of the Equipment

Every effort was made to adapt the laboratory to a variety of specific uses. Between classes it appears to be a comprehensive exhibit of electrical household equipment. The ease with which equipment may be moved about, however, will convert the laboratory into a laundry laboratory for one class, a range laboratory for another, etc., with adequate space for students to get about easily. With the wired work-tables removed, the laboratory may become a large room flanked by equipment accommodating a sizable group for a demonstration. A particular feature is a kitchen-like arrangement at one end of the room, permanently installed, which acts as a suitable background for such a demonstration.

The portability of the equipment makes it possible to study equipment in unit arrangements; that is, all electric kitchens may be assembled, of various shapes and sizes, or an all-electric laundry, so that space requirements as well as convenient arrangements may be studied. In the light of present trends in housing, this is a highly important feature, which makes the laboratory of value in connection with courses in house planning and interior decoration as well as in connection with courses in household management and equipment.

All the laboratory circuits clear through a distribution panel and circuit breakers which are located conspicuously in the laboratory so that they may be used conveniently in class studies.

Careful attention is given to the lighting requirements of this room, and provision is also made for the study of home lighting for eyesight conservation.

While the laboratory was planned particularly for a study of electricity and electric household equipment, careful attention was given to the selection of cabinets, plumbing, ventilation, wall and floor covering, etc. Each water heater is piped to a faucet over a sink, so that there is no need to provide a large number of drains; however, one floor drain was an important addition. All faucets are equipped with flexible hose so that washers and dishwashers may be filled without unnecessary lifting of water. A combination sink and tub is included, so that a plumbed tub is available for laundry studies.

Carefully selected storage cabinets—some with glass doors—house small electrical equipment, so that it is on display continuously, yet safely locked away when not in use. A master switch gives the instructors the assurance that no equipment is left connected and turned on between classes; and that none could be turned on and left on by the many interested visitors who frequent the laboratory when no instructor is officially in charge.

In accepting the electric equipment, which was thoughtfully selected by those supervising the course, and generously supplied by manufacturers, special attention was given to securing "types." The equipment includes ranges, refrigerators, water heaters, clothes washers, dish washers, ironers, mixers, irons, vacuum cleaners, waffle irons, and a large number of other small appliances such as toasters, coffee makers, space heaters, lighting equipment, water cooler, electric clock, etc.; in fact, a fairly representative collection of most electrical household equipment. A considerable amount of equipment carrying the TVA stamp of approval was included.

Supplementary equipment such as refrigerator storage dishes, pans and kettles suitable for use on the electric range, lighting equipment which can be used to modernize and make adequate the lighting in houses that have been inadequately wired, also are included. Special emphasis is in all cases laid on "types," for there seems to be no other way to avoid getting that over-supply of equipment which would clutter the laboratory until it became unwieldly.

The Response to the Course

The laboratory was first used, in the summer of 1934, by classes in a short course in home electrification. This course, planned by Miss Harris and the author, was a pronounced success. It was held in two sections. Students from all the southern states, and from as far away as California and Michigan, joined the classes. A merchandising firm enrolled two of its salesmen for the training in practical electrification.

Miss Harris plans to use the laboratory in courses in the regular curriculum, with full credit on Bachelor's or Master's degrees, and for special classes of homemakers and others directly interested in home electrification. More than 1,500 people, in addition to the classes, visited the laboratory during the first three months.

Special testing instruments such as watt-hour meters, watt and volt meters; oven testers, etc., both indicating and, in some cases, recording instruments, are used in some of the class studies, so that cost as well as performance and utilization studies may be made. No attempt is made to determine which water heater, range, refrigerator, etc., is best. Instead, a conscious effort is made to acquaint students with an understanding of how to select, operate, and care for electric household equipment; of what electricity rightly used can mean to the better management of time and effort in the home, as well as how it may be used discriminatingly and to the advantage of the consumer—particularly the consumer with limited income.

VIEW OF WEST OR TERRACE SIDE OF MOSHER-JORDAN HALLS, UNIVERSITY OF MICHIGAN
Illustrating window groupings and broken roof lines

Dormitory Design and Equipment

BY INEZ V. BOZORTH

DIRECTOR, THE LAWYERS CLUB AND LAW DORMITORIES, UNIVERSITY OF MICHIGAN

DORMITORY planning for colleges and universities has taken great strides in the past ten years. The institutional atmosphere is rapidly disappearing and in its place we find more nearly the atmosphere of the home. The influence of environment upon the student, especially in his first and second years, is being given earnest consideration by educators and parents.

In deciding upon the general plan of building, many factors enter into the study. Is it to be a part of a definite program of campus building? How many students are to be housed? What amount of money is available for construction and for furnishing? How is it to be operated? Is it to be self-supporting in whole or in part? Is it to be used by men or women? What atmosphere is desired? Is the residence hall to be used as a social center for the campus, or strictly as a student residence? If the student body be a large one, residence halls of small units are socially desirable, while the reverse may be true of a small campus.

Consult an Experienced Dormitory Manager

The wise architect knows that he has little or nothing to lose and much to gain by submitting his building plans for a dormitory or college residence hall to a person experienced in the management of such an organization; if possible to the person who is to be actively in charge of the building. Much inconvenience and probable tearing-out and rebuilding can be avoided if this step is taken before final plans are drawn and specifications written; for that person, whether man or woman, has learned from experience what makes for convenience and ease of operation, and what adds to operating cost and other problems of management. Good planning calls not only for technical knowledge and skill but for an understanding of the problems of management.

The Size of Residence Units

The cottage unit of 25 to 30 students is considered the ideal social unit, but the cost of construction and of maintenance is high. Units of 50 to 60 residents are considered the practical ideal. A building containing two units is a frequent arrangement, with a common kitchen and serving room but with separate social and dining rooms. Units of this size often are built in groups of two, three or four. On many campuses units of 80 to 120 are found, but are rather too large to be successful social groups. Greater group harmony and individual development are possible where the person in charge can know the individual resident personally.

In the large city colleges and universities and in other places where land values are high or the building space restricted, much larger units are used, housing 250 to 500 people. Such buildings are in reality residence hotels.

A well-planned residence hall affords plenty of light and fresh air and provision for quiet and recreation. The per capita cost of construction and furnishing varies from $1,000 to $5,000, depending upon student needs, climate, building materials used, wage scales, etc.

Location and Orientation

One of the chief points to be considered is that of general location. The setting often determines the type of architecture to be used, the size and the shape of the building. Avoid a location where nearby buildings obscure the view of the sky or cut off light and free circulation of air. A site a short distance from the main campus buildings, especially on higher ground, often affords a finer view and gives greater privacy to the building. The direction of prevailing winds also has an important bearing on the choice of location.

SUN PORCH, MOSHER HALL, CONNECTED BY FRENCH DOORS WITH LIVING-ROOM ON RIGHT, SHOWN BELOW

In order to avoid an institutional appearance, the residence units should follow in outline the letters L, H or U rather than a straight line. A complete square or quadrangle, unless it is a large one, prevents free circulation of air, as does a building of V shape. The slender rectangle as the unit shape is most advantageous. It gives the maximum of light and air, and additions of new units are easily made. Its severe lines may be broken in a number of ways. If the axis of the building runs north and south, every room will have sunshine some hour of the day, or if the complete square or U-shaped building is placed at an angle with the points of the compass, a greater number of rooms will have direct sunlight. Careful consideration should be given the room arrangement and the interior appearance of the building as well as the decorative plan of the exterior, in order that all available space may be used to good advantage.

The Main Floor

The main entrance, usually at the center of the main axis of the building, sometimes at the side, opens onto a lobby or hall of good proportions. In the northern part of the country, a vestibule at the immediate entrance is a necessary protection in winter. On one side of the lobby is located the hall office or desk, conveniently arranged for the handling of mail, parcels, student keys and register, and for the giving of general information.

LIVING ROOM NO. 1 IN MOSHER HALL

Sun porch on left; library doorway at left background. Picture taken from stage across front end of room

It should be inconspicuous to avoid the institutional or hotel appearance yet give control of the entrance.

A coat-room nearby, with lavatory, should be provided for men callers (or women, as the case may be) and for special use on party nights. When the dining room is on this floor, a small coat-room for the residents' use is a great convenience at noon-time or, if men are not permitted to call until late afternoon, one coat-room can serve the dual purpose.

One or two small reception rooms, opening off the lobby, offer a place for the entertaining of callers, and social control of them is easier if there are no doors, or at best French doors of glass. At one side of the entrance hall, perhaps down a short hallway, is the main living room, large enough for use in formal entertaining, for tea dances and other house gatherings. This room should be cheerful and bright, with a sunny exposure if possible, and a large fireplace. A low stage across one end of the room, for use in various programs and as the station for the dance orchestra, adds greatly to the interest and uses of the room. The floor should be suitable for dancing when the rugs are rolled up. The dining room, located near the living room, affords an excellent arrangement for entertaining, either as an additional dancing floor or as the supper room. If the dining room is not near, a small kitchenette is a convenience in the serving of afternoon tea and refreshments for informal parties.

The stairways from the main floor to the student floors should be two in number. Fire laws usually require that these be enclosed in fireproof walls, with fireproof doors on each landing, and that they be easy of exit.

The suite of the head resident or social director should be on the main floor, near the living room, and a suite for overnight guests. Should it be necessary to include student rooms on this floor, many unpleasant and sometimes awkward situations will be avoided if they are in a wing or on a separate corridor cut off from the public rooms. The office and suite of the house or business director should be located conveniently near the front desk yet easily accessible to the food department and service entrance.

The recreation room frequently is placed on the floor below the living rooms; in some buildings a large attic room is used. The former location, if well lighted and free from dampness, is more satisfactorily supervised and controlled.

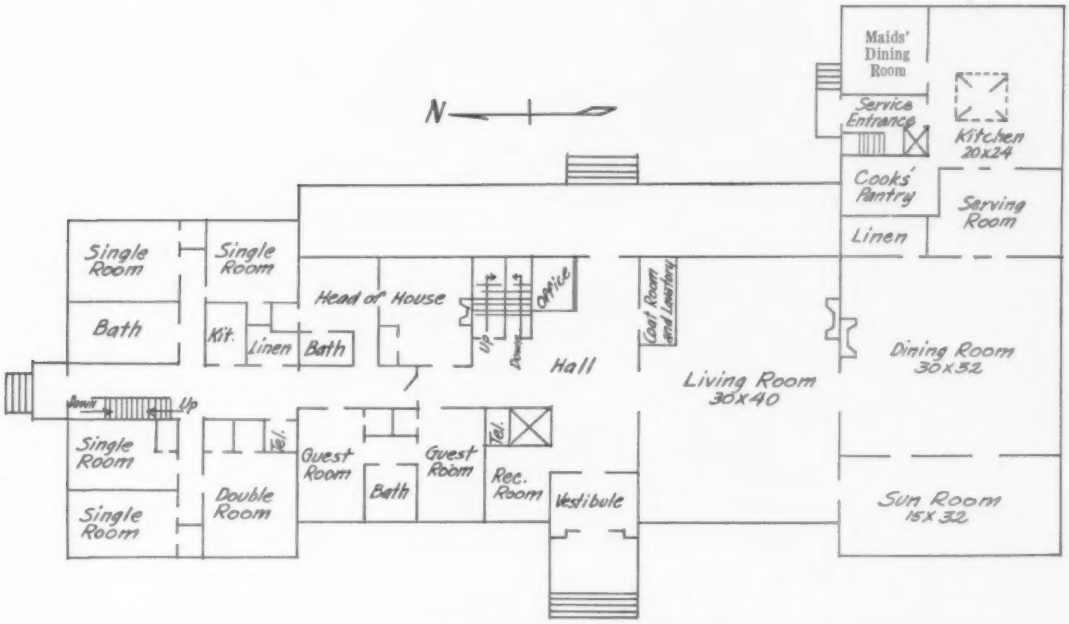
Dining Room and Kitchen

For greater convenience of supervision and the quick handling of foods, the dining room and the kitchen should be located on the same floor, preferably the main floor. Sometimes a one-story wing in the rear of the dining room provides space for the kitchens and storage rooms. This arrangement affords ample light and cross ventilation and cuts off from the student floors above the vibrations and noises caused by motors and kitchen machines. In many older buildings the dining room and kitchen were located in the basement or half-basement rooms, with low ceilings much disfigured by pipes and ventilating ducts, short windows set high in the walls, and supporting columns that broke the room space unpleasantly, a very undesirable arrangement. If the land is sloping and the dining room and the kitchen on this lower floor are above ground level, delightful dining-room arrangements are possible. The ceiling should be of good height, with all overhead pipes concealed, and the exposure that gives good light and a pleasant outlook. This is the one room in the house where the whole family gathers three times a day and it deserves great consideration and care in the planning and decoration. The kitchen itself calls for treatment of a highly technical nature, and it is here that the advice of an experienced and technically trained person is absolutely necessary for satisfactory results.

Student Rooms—Bathrooms—Laundries

The upper floors are given over to student rooms, bathrooms, and the several service rooms. Opinions differ as to what are proper room sizes. An average single room is 9 x 12 feet, exclusive of closet space, with ceiling 8½ to 9 feet high. A floor area of 140 to 160 square feet is more desirable, with closet space of 3 x 4 feet. There should be a ventilator in the closet door as well as in the room door. The single room, a study-bedroom, is the most desired by students of college age. Next in popularity is a suite of three rooms consisting of two studies and a joint sleeping room. This suite plan is preferred to the one of a joint study and two bedrooms because of the frequent difference in study hours and social habits of the roommates. This condition is also true of the double rooms and two-room suites, whether the residents are men or women. The minimum size of the double room, exclusive of closet space, is 10 x 14 feet and necessitates the use of a double desk and narrow beds, and is not recommended as a standard. A room of 12 x 15 is a good size, but 14 x 16 is more desirable and permits of individual study desks, bureaus, and single beds of full width. The floor area of a double room should average not less than 180 square feet.

On the student floors, space should be provided for telephone booths, well insulated, one in each corridor, a housemaid's closet with sink, a linen closet and a room for the storage of extra bedding and cots. A telephone in each room is a great convenience but adds materially to the rental charge of the room. A signal system controlled from the student desk will do away with the ringing of telephone bells and the shouting of calls down the corridors.



SUGGESTED PLAN OF MAIN FLOOR OF A SINGLE DORMITORY UNIT OF 50-60 RESIDENTS

Recreation room under living room and hall. House laundry, sewing room, food storage, etc., under kitchen and dining room. The kitchen wing—one story and basement—has a sun deck above. Trunk storage under north middle section of building

The size and number of bathrooms is determined by the number of fixtures used, whether there are basins in the student rooms, or groups of basins in toilet rooms. The approved number of fixtures is one to every four to six persons. Showers are preferred to bathtubs and should be enclosed by partitions, with dressing space curtained off and hooks provided for dressing gown and towels, but there should be one bathtub at least in every bathroom. The bathroom should be located near the middle of each floor but not on the front of the house, especially if it faces the street. Where funds permit, rooms with connecting bath are very convenient and do away with the common bathroom. This arrangement encourages greater privacy and sanitation, but it does add to the construction and operating costs of the building.

A kitchenette and pressing room should be provided on each floor or for every unit of fifty residents. This room should have natural ventilation and simple but adequate equipment for its purpose.

Student laundries are sometimes located on the room floors, near the bathroom, sometimes in the basement in common with the house laundry. A laundry room near the bathroom tends to encourage the use of the laundry tub for personal laundry work rather than the use of the bathroom lavatory, and has the further advantage of greater accessibility.

A small sitting room or study on each floor adds to the general atmosphere and has a definite social value.

Floor and Wall Finishes

The question of what is the most satisfactory floor material is one much discussed. An oak or maple floor, well waxed and polished, gives beauty to the living rooms and is also a satisfactory floor in the dining room. Tile and terrazzo are surfaces easily cleaned and make good floors for lobby and bathrooms but are noisy. Cork tile is recommended as a satisfactory floor by some architects. The new composition floors are interesting in color and design, wear well, and are quiet. When waxed and polished they can be used for dancing. Concrete, painted or plain, is the least desirable floor surface. Quarry tile is a favorite for kitchen and serving rooms. Where wood floors and large rugs are too expensive, linoleum in many patterns and several weights is a very acceptable substitute. It is used also in hallways and corridors, is easily cleaned, is quiet, and gives an attractive appearance when well cared for.

The wall finish is another puzzling question. Oil paint is easily washed with soap and water and can be used in many pleasing tints. Washable wall papers give variety, are easily cleaned and long-lived. Wood paneling in the living room, the dining room and the lobby is very lovely and in the long run is not much more expensive than some of the other finishes. Careful attention should be given to the use of acoustical materials on the ceilings of the public rooms and the hallways, for no other detail adds more to the quiet and comfort of the residents. Where

acoustical ceiling and wall materials are effectively used, there is a surprising improvement in the manners and conduct of the students.

Essential Equipment

Following are some of the more essential articles of standard building equipment:

Ventilating fans to give forced ventilation in all bathrooms, maid's closets, laundries, kitchenettes, dining rooms and the main kitchen and serving room. In addition, the bathrooms, laundry and house closets should have ventilators in the bottom panels of the doors, while the student room doors should be equipped with an adjustable transom above the door or louvers in the top panel.

A linen chute to connect the several linen closets on the upper floors to the main linen room on the ground or basement floor. A waste chute and incinerator, with an opening on every floor, from attic to basement.

A power vacuum system if large rugs are used in the bedrooms, otherwise a good portable vacuum cleaner. This equipment can be used in cleaning mattresses, window hangings and upholstered furniture.

Drinking fountains of an approved type, with circulating chilled water, placed near the bathroom on each floor and in a convenient place in the main lobby.

Plumbing fixtures of the best grade of chromium finish are a sound investment, and spring faucets in the lavatories will prevent waste of water and over-running of washbowls. All supply and drain pipes should be of sufficient size to permit a rapid flow of water, both in and out of basins and tubs. Toilet-bowl valves should be regulated to give a good flow of water and yet be quiet.

Ample floor drains in all ground-floor storage rooms, in the scullery and the kitchen, in bathroom floors, and wherever water is likely to overflow.

Hand fire extinguishers and fire hydrants with attached hose, placed at regular intervals throughout the building, readily accessible in case of fire.

Good electrical refrigeration is essential to the proper care of foods, and great care should be given the selection and the installation of this equipment.

This list is not a complete one but does cover a number of the major items to be found in the well-planned and well-equipped dormitory. A careful study of other buildings of a like nature will quickly show what is good and what is bad in the planning and equipping of dormitories.

WATER SUPPLY FOR DRINKING AND WASHING

(From "Safety and Health of the School Child," a Self-Survey of School Conditions, by James Frederick Rogers, M.D., Consultant in Hygiene. Circular Number 65, Office of Education, United States Department of the Interior, Washington, D. C.)

WATER SUPPLY (DRINKING)

1. Is the water supply safe at its source? (Free from possible disease germ contamination.)
   School officials should be certain that the supply of drinking water is safe.
2. Is it safely delivered? (No danger of possible contamination.)
3. Are drinking fountains sanitary? (Lips of drinker do not touch the nozzle and child can not place mouth in water from which previous child's lips have been removed.)
   There are many unsanitary drinking fountains in use and many which were once sanitary have become unsafe.
4. Is there a fountain for, at the most, every 75 children?
5. Are the fountains low enough for use by all children?
6. Are the water pipes so placed that the water does not become heated?
   Many such pipes are placed too close to the furnace or to heating pipes.
7. If there is a water tank, is it kept well covered and the water delivered by faucet?
8. Is it kept in a cool place?
9. Are individual cups furnished, or brought from home?
10. Are the latter kept in a sanitary condition? (Best kept in pupil's own desk.)
    We have seen individual tumblers placed upside down on a board near the water tank. The saliva on each glass mixed readily with that from neighboring glasses. The intention was good but the result bad.

WATER SUPPLY (WASHING)

1. Is warm water for hand washing available? In sufficient quantity?
   It is not worth while to preach cleanliness if there are not facilities for its practice.
2. Is there a washbowl for every room?
   It may be that there are abundant washing facilities outside the classroom. This question applies to schools where this is not the case.
3. Are paper towels furnished or is a towel brought by each child from home weekly?
4. Is soap furnished in suitable containers?
5. Where there are indoor toilets, are there wash basins in the toilet rooms, one bowl for, at the most, 30 pupils?
6. Are paper towels and soap furnished in such toilets?
7. Are all fixtures kept clean?
   Pupils should be taught to keep fixtures as clean as possible but it is the business of the janitor to give them a thorough cleaning daily.

Dick's House—The Dartmouth College Infirmary

BY JENS FREDRICK LARSON

ARCHITECT, HANOVER, N. H.

DICK'S HOUSE was given to Dartmouth College, Hanover, N. H., by Mr. and Mrs. E. K. Hall in memory of their son, Richard Drew Hall, of the class of 1927. Dick's House represents a labor of love in its construction and planning and an enduring memorial to a son who loved the College of which he was a member. Mr. Hall, a member of the class of 1892, has given the following high purpose to the House:

"The purpose of Dick's House is to provide a home for the boys of Dartmouth College when they are sick or ailing.

"It is our hope that they will come to feel that 'going up to Dick's House' is the next best thing to going to their own homes when they are in need of either the care or the surroundings that the dormitory or fraternity house is unable to furnish.

"The House will richly serve its purpose if it is able to bring some measure of comfort to the boys of Dartmouth when they need it most, and if the boundless joy, the good cheer and the helpful spirit which filled the life of the boy whose name it bears may for all time abide and carry on within its walls."

Although maintained as a separate institution, the infirmary depends upon the Mary Hitchcock Hospital for many of its facilities. The first floor of the infirmary is connected with the kitchen floor of the hospital, and a similar connection places the second floor in direct contact with the operating rooms of the hospital proper. The infirmary has a normal capacity of 40 beds, but has been planned to accommodate 60 beds in emergencies.

The building is of Colonial architecture in the Dartmouth tradition. The walls are of water-struck brick, laid with a ⅜-inch weathered joint of natural colored mortar. The entrance trim, frames and window sash are of wood, painted a dulled white. The shutters match the trim in color, but the blinds are sage green. The roof is covered with a fading green slate in various shades. The terrace at the entrance is grass with flagstone walks.

As One Enters

Perhaps the most striking feature of Dick's House is the reception hall with its "Scenic America" wall paper, depicting America in 1840. Along the walls and up the main stairway stretch brilliant scenes of Boston Harbor, West Point and Niagara Falls. The wall paper has been heavily lacquered to preserve the colors, and the plaster of the wainscot below is covered with canvas. The woodwork is painted blue-green, and the floor is in alternate squares of gray and Verde Antique.

To the right of the front entrance is the office of the House Mother. Here patients are regis-

tered and the necessary office files are kept for the administration of the House. Here too is a master radio set, to which the head set at each bed and the loud speakers in various parts of the building are connected.

The waiting room for out-patients opens out of the House Mother's office, and a passageway leads to the examination rooms and the doctors' lounge in the front of the south wing. Here minor injuries are treated under the most favorable conditions of equipment and surroundings. The lounge offers an opportunity for staff meetings of the doctors and is equipped so that a doctor can comfortably spend the night there if the condition of a patient should require it. In the corresponding rooms to the rear are quarters for three resident nurses.

Kitchen—Dining Room—Living Room

The diet kitchen is situated in the main part of the first floor at the rear. The latest labor-saving devices are installed here, such as a dish-washing machine, an electric refrigerator and metal cabinets. Although the food is prepared in the main kitchen of the hospital and carried the short distance on electrically heated trucks, the diet kitchen has a range for reheating food and the preparation of special diets.

At the rear of the entrance hall is the dining room for the use of patients who may be staying in the House. The room overlooks green fields to the east, and its whole atmosphere is one of good cheer. The natural lightness of the room has been intensified by light-colored wall paper and painted, cream-colored woodwork. For contrast, the hangings are red-spotted white muslin, and some of the moldings of the cornice have been striped with red. The floor is Verde Antique rubber tile. Perhaps the most interesting piece of furniture in the room is a fine old pine table formerly used at one of the Shaker settlements in New England.

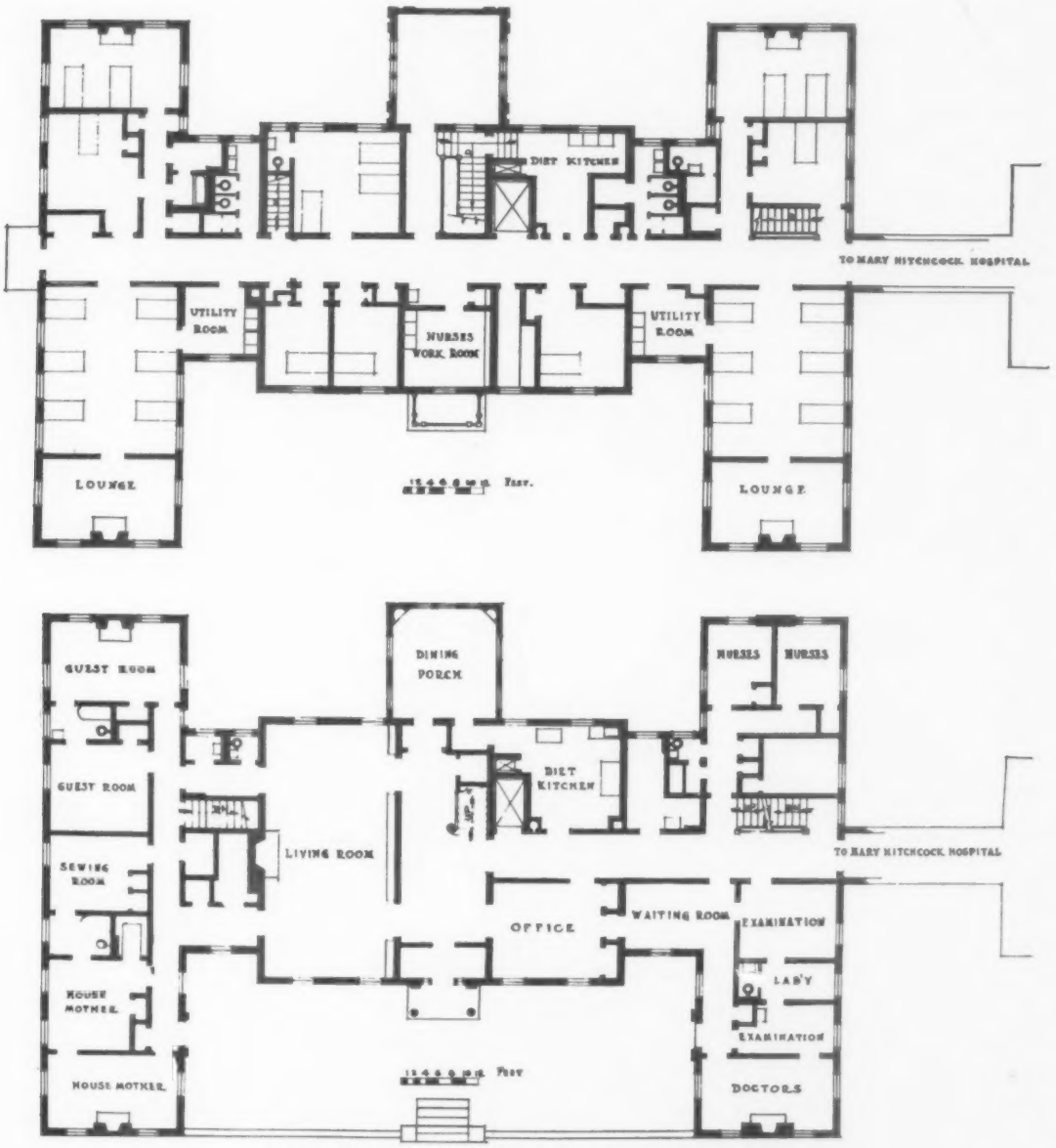
THE DINING ROOM

To the left of the entrance hall is the main living room. Most of all, this room expresses the personality and the spirit that is felt throughout Dick's House. Over the fireplace is a portrait of Dick Hall painted by J. D. Katzeiff, so successful that one gets the impression of a real personality to welcome visitors. The woodwork is painted a dark blue-green, and the walls are covered with 12 x 24-inch oblongs of Japanese paper in slightly varying tones of warm tan. The ceiling is tinted to harmonize with the woodwork, and is a very light blue-green. The floor is of rubber tile, colored to simulate Verde Antique marble. The whole atmosphere of the room is so fascinating that one is tempted to linger with its comfortable davenports, bright rugs and unique reading lamps. A library of about one thousand books lines the south wall. Each book is a personal gift from friends of Dick and of his family.

AS ONE ENTERS DICK'S HOUSE

The front of the north wing contains the rooms of the House Mother, which can, when desired, be shut off from the rest of the building. Toward the rear is a room equipped with an electric sewing machine and other conveniences for the care of the linen used in the House.

The rear wing on the north contains two rooms intended for the use of parents who must be near their sons when seriously ill. These rooms, too, form a separate unit of the House.



FIRST AND SECOND FLOOR PLANS OF DICK'S HOUSE

The Patients' Quarters

While the first floor of the House is largely for administrative and social purposes, the two upper stories, conveniently reached by an elevator with micro-leveling device, contain the quarters for patients. On the second floor is the head nurse's desk, with telephone control throughout the House and connection with outside. If a patient requires attention, he presses a button which shows a signal light at the head nurse's desk, also over the entrance to the patient's room, in the diet kitchens and elsewhere throughout the House where attention might need to be called. This light stays on until the nurse answering the call switches it off, which can be done only at the patient's bedside.

On the second floor are five single rooms, two 2-bed rooms, one 3-bed room, and in the front of each wing a large room accommodating six beds. A unique feature of all the rooms is their nomenclature. Instead of numbers, each room bears the name of one of the Dartmouth presidents or of some individual intimately associated with the College. At the front of each of the two six-bed rooms is a lounge for convalescent patients.

In case a contagious disease appears in the College, the rooms on the third floor are available, and should emergency arise requiring more space, the rooms at the north end of the second

floor can be completely segregated from the rest of the building and serviced from the third floor. The third floor has a capacity of eight beds, five rooms being private and each room forming a self-contained unit with its own toilet seat and lavatory. Large panels of glass set in the partitions between the rooms enable the nurse to oversee the patients with the least number of trips into a room.

Patients with contagious diseases do not pass through the rest of the house, but enter by a special entrance in the basement and are carried to the top by elevator, while their clothes are left in the disinfecting chamber. Consideration of this aspect alone, the handling of contagious cases, shows what a need Dick's House fills in Dartmouth College.

The second floor contains a serving diet kitchen and various service rooms, and at the rear a sun porch of vita-glass which allows the beneficial violet rays of the sun to enter. Patients in need of this treatment may be brought to the porch on their beds or in wheel-chairs.

Furnishings and Finishes

Every effort has been made to have the House a home and as little like an institution as possible. To this end the furnishings and decorations throughout were planned and chosen under the personal direction of Mrs. E. K. Hall. There are no white walls in the corridors, living room or sick rooms, and no white furniture or beds. The furniture in each private room is different. The beds of steel, attractively tinted, are of the Gatch type and adjustable for the greatest comfort and convenience. Reading lights are provided, as well as bedside telephones and radio headsets. The night light in the large rooms is set near the floor, so that the nurse can see her way about without using enough light to disturb the patients.

The two upper floors are planned to afford the best possible care with the least amount of effort. All floors are rubber tile, which requires a minimum of care for its proper upkeep. All diet kitchen sinks are of monel metal and are backed with rubber tiling, so that damage is impossible from splashing water. All plumbing and heating fixtures are hung from the wall, preventing the accumulation of dust in inaccessible places. The walls are papered and the paper sprayed with several coats of lacquer, so that they may be readily cleaned.

The building is of fireproof construction of steel and concrete with load-bearing brick walls. It will serve many generations of Dartmouth students, owing to the careful planning of its life.

Located as Dick's House is, overlooking Occom Pond and on the road to the golf links, the students convalescing can watch the sports on the pond in winter and see their classmates passing by for golf in the warmer weather.

PRINCIPAL TYPES OF EQUIPMENT INSTALLED

Cleaning Equipment—The Spencer Turbine Co.
Signal Systems—Holtzer-Cabot Electric Co.
Doors—Roddis Lumber & Veneer Company
Heat Regulating System—Johnson Service Co.
Plumbing Fixtures and Sanitary Equipment—American Radiator & Standard Sanitary Corp.
Showers—Hoffmann & Billings Mfg. Co.

Business Methods in the Pittsburgh School Cafeterias

BY HELEN F. GREGG

MANAGER, DEPARTMENT OF SCHOOL LUNCH ROOMS, PITTSBURGH, PA.

SCHOOL cafeterias from Maine to Florida and from coast to coast are serving wholesome food to boys and girls daily. In addition to this service, their administrators are attempting to develop in the child the ability to make a wise choice of food for his noonday lunch.

The Pittsburgh Board of Education recognized the importance of cafeteria service by establishing a cafeteria in one of the high schools, in 1914. This service has been so increased that total annual sales for the past few years have averaged $500,000, in spite of the depression.

Experiences in the Pittsburgh cafeterias during the past twenty years show that efficient administration, wise purchasing, and accurate accounting of all transactions are necessary to secure economy in this service. The success of any city school system of cafeterias depends upon the organization of the department, the policies established by the board and the director of the department, and the methods used in accounting, purchasing, and sales.

Organization

Pittsburgh has a Board of Education consisting of fifteen members, appointed by the Common Pleas Court. The Board of Education appoints three superintendents—in charge of instruction, supplies, and buildings respectively. This is recognized as a multiple-type form of organization. The Director of Cafeterias is selected by the Board, is elected for one year, and works directly under the Superintendent of Supplies. The present Director has served for fifteen years.

The entire personnel is selected by the Director. The assistant director, and the visiting supervisor of cafeterias are recommended to the Board for

VENDING MACHINE FOR SELLING STRIP TICKETS, AT THE ENTRANCE TO A PITTSBURGH CAFETERIA

election, but all other employees are appointed. The Director, the bookkeeper, five clerks, and the warehouse stockman are employed for twelve months; the assistant director, visiting supervisor, and two assistant warehouse stockmen are elected for ten months. Three supervisors are in training for six months or more during the year. Twenty-three cafeterias are now in operation. Their supervisors received in-service training in the department before being appointed.

The administrative offices of the department are located in the administrative building adjacent to the departments of supplies and buildings, and the activities of the department coordinating with the building and supply departments are facilitated by this arrangement.

Policies

The business methods of the cafeteria department depend largely upon the policies set up by the Board of Education. The Board houses the cafeterias and purchases adequate initial equipment for efficient operation. Light, heat, power, and janitor service are furnished. Sufficient money was advanced for a working capital when the cafeteria service was instituted, but after 1917, three years after the first cafeteria was opened, this money was paid back to the Board. All equipment replacement and maintenance expense is paid from cafeteria funds.

All the school cafeterias have three closed lunch periods of thirty minutes. The pupils, except a few living conveniently near the school, who are allowed to go home for lunch, remain in the school cafeteria for the full period. If the weather permits, they are given the opportunity to leave the cafeteria and go out on the campus for the last ten minutes of the period.

The members of the Pittsburgh Board of Public Education think it is more desirable to serve the children food items at a uniform fixed price and regulate the quantity, at the same time maintaining the best quality of material used, than to maintain the quantity of the various food items and regulate the price. Therefore the Pittsburgh cafeterias maintain a fixed price of 5 cents for all items except milk (one-half pint) which was sold during the last school year for 3 cents. We believe the single food item method of sales is superior to the plate lunch and we have always used it.

The Pittsburgh schools bake their own bread and rolls. It is believed that not only are the costs lower by this method but that a superior product is made. The greater initial capital outlay by the Board is justified in service rendered to the taxpayer and the pupil served.

Cakes and pies are made in the cafeterias daily and have proved very popular with the pupils. This policy is challenged by some cities that feature a very large ice cream and cookie business, but we believe that cake or pie made of whole fresh milk and fresh eggs is just as nutritive.

Candy is sold in all school cafeterias after the lunch line has been formed. It cannot be purchased during the first five minutes of the lunch period. The profit received from these sales is passed on to the pupil by offering greater values in the food items sold.

All food and supplies are purchased in quantity through the central office, which insures an accurate accounting of purchases. The cafeterias are operated for service to the pupil, and the operation is on a slight margin of profit. Frequently a loss is shown for several months at a time, but there must be sufficient profit at the end of the school year to cover all emergencies.

Methods

After definite policies have been established, the methods employed in maintaining them should be examined. Two procedures merit some discussion, namely, accounting and purchasing.

It is good business to pay for what you get and get what you pay for. From the very moment a thing is contracted for or purchased until it is consumed or sold, an accurate accounting is paramount. Budgetary procedure, financial reports, the payroll, counter checking, are after all dependent upon methods of accounting. The crux of the situation is the accounting of all food sold. The exchange of cash, token, or ticket for food needs careful accounting.

For many years aluminum checks were used in our cafeterias. We have gone off the "aluminum standard" and are using tickets instead. At the entrance of all cafeterias, vending machines, electrically equipped and operated by pupils, have been installed. Strip tickets, serially numbered, are sold in denominations of five and one cent. The Auditor for the Board is given a record of the quantity of tickets with their serial numbers as they are issued to the different lunch rooms. In this way, the supervisor in charge is responsible for a nickel or a penny for each ticket she has received. No cash is accepted at the lunch or candy counters. An adult employee acts as tray checker at the end of the counter. She checks the tray, accepts the tickets, and places them in a locked container. These tickets are collected daily, and sent to the administrative offices, where they are counted by a machine. The count should tally with the record of the number of orders sold over the counter. This counting machine is an accurate method of counting tickets, for it employs the photo-electric cell and is fool-proof. After the tickets are counted they are placed in the incinerator and burned.

This system is more accurate, economical, sanitary, and practical than the check system. On Mondays some children buy an entire week's supply of tickets, and this slows up the ticket line. By actual count in one of our large high schools in which two machines are used, the maximum time consumed in purchasing tickets was 5 minutes 14 seconds. When this system was first installed two years ago, some experienced cafeteria supervisors doubted its value, but our experience has proved it to be very successful. All money received is collected by a bonded collecting agency. This is done every week in the small schools and three times every two weeks in the large schools. All supervisors, the Director, and the assistant director are bonded in proportion to their responsibility for handling money. All safes in school supervisors' offices are insured against theft. This expense is borne by the cafeteria receipts.

Purchasing and Accounting

Rigid standards for all food items and supplies have been set up by the department. Although Pennsylvania school law permits of purchasing perishable products for cafeterias without bid, all materials are purchased by contract whenever possible. Bid sheets are prepared for this purpose. All food items are checked periodically to the standards set up. Two samples of canned goods are sent in, one to be opened for inspection at the time of purchase and one retained to check goods when delivered. The building department has prepared specifications for all equipment installed in the cafeterias. These specifications are used in the purchase of all equipment.

As food is the main item sold, cost accounting of it is extremely significant. A weekly and monthly statement is made to all schools for this purpose. The weekly statement shows (1) receipts from sale of food, (2) cost of food used, (3) percentage cost of food. The average per cent of food costs for the third week in May of this year was 51. This weekly statement quickly shows when costs run high, and the cause can be ferreted out and corrected at once.

Cost of operations has averaged 30-31 per cent of total receipts.

Careful attention must be given to adequate and accurate accounting as well as to wise purchasing to insure an efficient business operation of the school cafeteria, and an adequate service to the pupil at a reasonable cost.

ONEIDA COMMUNITY, LIMITED

MAKERS OF COMMUNITY PLATE

ONEIDA, NEW YORK

Silverware Directory and Buyer's Guide

WHY BUY UNKNOWN BRANDS when you can purchase Silverware made by the **Oneida Community, Ltd.,** at lowest possible prices?

9 LB. HEAVY-WEIGHT SILVERWARE

How to order from your wholesaler, Hotel Silverware manufactured by the Makers of COMMUNITY PLATE	LIST PRICES ON TEASPOONS Write to your supply house for discount		Identify Silverware Made by Oneida Community, Ltd. by these Brands
	WINDSOR	ASHLEY BREVOORT SENECA	
When you want to purchase the **most silverware at the lowest cost,** Specify—½ Plate—No Overlay—Butler Finish—9 lb. Blanks	$1.67 Dozen	$1.80 Dozen	"1877 N.F. Co."
For extra wear at little additional cost, Specify—½ Plate—With Overlay—Butler Finish—9 lb. Blanks	$1.80 Dozen	$1.93 Dozen	"1877 N.F. Co. V."
For Silverware that costs less in the long run, Specify—Oneida Hotel Plate—heavier than standard plating—9 lb. Blanks	$2.07 Dozen	$2.20 Dozen	"Oneida Hotel Plate"

10½ LB. EXTRA HEAVY-WEIGHT SILVERWARE

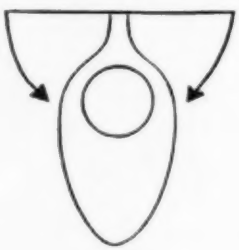
How to order when you want 10½ lb. Extra Heavy Blanks	WINDSOR	PACIFIC ETON ERIE	Extra Heavy Weight is Branded
Specify—Oneida Hotel Plate—Heavier than standard plate 10½ lb. Blanks **Most economy in the long run.**	$2.60 Dozen	$2.73 Dozen	"Oneida Hotel Plate"

10½ lb. Extra Heavy-Weight Silverware

BY THE MAKERS OF COMMUNITY PLATE

Butler Finish

Reinforced where it wears



Ideal for Educational Institutions

For the severe usage that Silverware receives in school cafeterias, lunch rooms, and home-making departments, scientifically constructed Silverware is needed.

Oneida Hotel Plate is not only pleasing in appearance but is built to endure—reinforced where it wears with an extra plate of pure silver. It costs less in the long run—*saves overhead expense.* . .

It is in every way a reflection of good management.

7 Reasons why you should use Oneida Hotel Plate

1. THE ONEIDA TRADE MARK *means Quality.*
2. MODERN DESIGNS *of fine simplicity set off your tables.*
3. EXTRA-HEAVY BLANKS, *plus heavier-than-standard plating, withstand hardest use.*
4. A HEEL OF QUADRUPLE SILVER *reinforces all staple pieces at the point of greatest wear.*
5. HEAT-TREATED FORK TINES—*designed and tempered for maximum strength.*
6. DeLuxe STAINLESS KNIVES—*Proof against rust, stain or tarnish, keen-edged and Mirror Bright.*
7. IT COSTS NO MORE, *with Oneida Hotel Plate, to do it right.*

ONEIDA HOTEL PLATE

9 lb. Heavy-Weight Silverware

BY THE MAKERS OF COMMUNITY PLATE

Butler Finish

For Educational Institutions

Your choice of sturdy—well made heavy-weight blanks offered at three price levels.

See Silverware Directory and Buyer's Guide on previous page.

An opportunity to buy enduring silverware at a saving in initial cost.

Made in three fine designs—Ashley, Brevoort and Seneca Designs. (Illustrated).

WINDSOR PATTERN

Available in both 9 and 10½ lb. weights and at four price levels. See Silverware Directory and Buyer's Guide on previous page.

Admiral Knife
Eton Design
¾ Actual Size

An Innovation in Knives
THE ADMIRAL KNIFE

A new All Stainless Knife

* Silver Plated Handle.
* Stainless DeLuxe Blade.
* Of Utility Size.

2 Knives in One—Can be used for steaks and chops, also for dessert, salad or bread and butter knife.

Practical for all purposes—reduces overhead.

The stainless handle will not corrode under plate—is not affected by moisture and foods that stain carbon steel.

Other Cutlery to fit every need—

KNIVES—STAINLESS BLADES

Embossed Dinner, (French Blade)
Embossed Dessert, (Straight Blade)

GRILLE KNIVES—STAINLESS BLADES

Embossed Dinner, (French Blade)

KNIVES—PLATED BLADES

Embossed Dinner, 12 Dwt., (French Blade)
Embossed Dinner, 12 Dwt., (Straight Blade)
Embossed Dessert, (French Blade)
Embossed Dessert, (Straight Blade)

Hollow Handle Knives are not carried in stock, but will be made to order in Eton, Erie and Pacific.

Special Stamps and Stamping accurately handled.

ONEIDA COMMUNITY, Ltd.
ONEIDA, N. Y.

ONONDAGA POTTERY COMPANY

Syracuse, New York

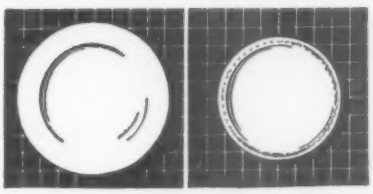
New York: 551 Fifth Ave. Chicago: 58 E. Washington St.

SYRACUSE CHINA

New ECONO-RIM China

Uses

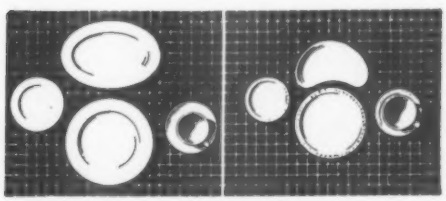
36% Less Space



These two plates have the same food area

This unusual space economy is made possible by a simple, yet radical, departure from conventional china design; namely, a smaller rim. Most of the total area of every piece of Econo-Rim is usable food space.

As a result, trays are less crowded and easier to handle. They are not so quickly filled and therefore encourage the buying of more food. Tables do not look cluttered and are more pleasing in appearance. And the smaller over-all dimensions of the Econo-Rim actually make the portions look larger.



Cuts Replacement Costs

Like all Syracuse China, the Econo-Rim body is extremely dense and sturdy. Breakage is unusually low. And the pattern, being under a hard glaze, cannot fade or wear off.

Patterns and Bodies

Econo-Rim patterns, most of them of simple design, are very attractive. Against the famous warm Adobe body, they form an unusually interesting background for any food.

Syracuse China is also available in conventional shapes and in stock patterns or any special patterns on white, Adobe or Old Ivory bodies. See samples at your dealer's or write direct for complete information.

SYRACUSE CHINA

A Product of
Onondaga Potteries

"Potters to the American People since 1870"

R. WALLACE & SONS MFG. CO.

Hotel Silversmiths

Wallingford, Connecticut

BRANCH OFFICES in New York, Chicago, Philadelphia, San Francisco, Los Angeles

ALL WALLACE DESIGNS

SPECIAL ORDER . . . OR THOSE IN STOCK ARE NOTED FOR THEIR ARTISTIC MERIT

This old-established firm has held firmly throughout the years to its high standards of quality . . . it has devoted itself heart and soul to carrying on traditions of silver made by expert craftsmen. The endurance of Wallace Silver Plate is a "buy-word" with those who have the responsibility of selecting silverware.

On the opposite page . . . evidence of the artistry and workmanship of the recently completed commission for the silverware for seven of Yale's new college buildings (the latest, Berkeley, was also similarly equipped by Wallace).

Below . . . just a few of the many stock numbers of strong and durable hollow ware that is covered by a special catalog . . . send for a copy of "Hotel Silver Plate—Flatware and Hollow Ware—for Hotels, Restaurants, Cafeterias, Dining Halls . . ." It's free!

0377½
Napkin Band

012
Butter Plate

092
Pepper or
Salt Shaker

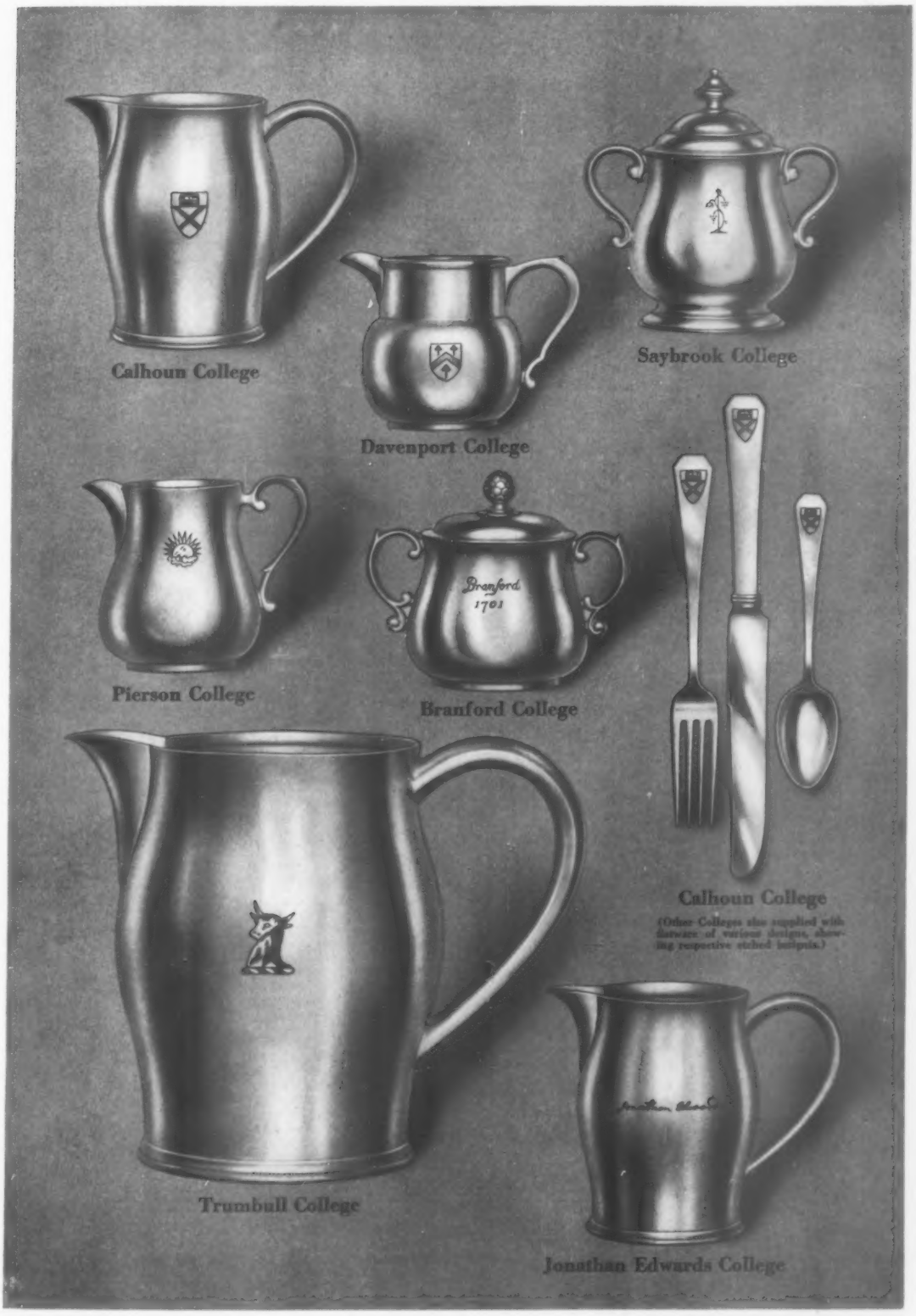
28R
Cream
Pitcher

28R
Covered
Sugar Bowl

28R
Coffee Pot,
Strap Handle

050
Bread Tray

THE AMERICAN SCHOOL AND UNIVERSITY



THE AMERICAN SCHOOL AND UNIVERSITY

EDWIN L. WIEGAND CO.

Electrical Heating Engineers and Manufacturers of Chromalox Heating Units Exclusively

7570 Thomas Blvd., Pittsburgh, Pa.

SALES AND ENGINEERING REPRESENTATIVES IN ALL LARGE CITIES

Licensees

In Canada: Canadian Chromalox Co., Ltd., Toronto 2, Ontario
Abroad: George Bray Company, Ltd., Leeds, England

CHROMALOX PRODUCTS

The line of patented, embedded type Chromalox Heating Units comprises a wide variety of electric heaters for operating temperatures up to 1200° F.

Air Heaters
Broiler Units
Cartridge Units
Cylinder Units, Hollow
Disc Units
"Finrods" and "Finstrips," for convection heating of air or liquids
Flat Iron Units
Foundry Moulding Machine Heaters
High-Voltage Railway Heaters
Hot Plates
Hotel Range Units
Immersion Heaters:
Blade and Cartridge Type
Immersion Heaters:
Heavy-duty High-voltage
Oven Heaters, Industrial
Percolator Units
Platen Heaters
Range Units:
Super-Speed Adaptor Type
Ring Units
Space Heaters
Special Heaters
Strip Heaters
Switch and Track Heaters, Railway

ELECTRIC HEATING SPECIALISTS ARE AT YOUR SERVICE

We specialize exclusively in the manufacture of electric heating units for all kinds of electric heating applications for domestic, commercial and industrial purposes. The cumulative knowledge and experience gained through many years of specialization in the proper application of electric heat is at your disposal, without obligating you, for the practical solution of your heating problems.

HEAT IT Electrically with CHROMALOX

Hotel Range Units—Round Type

For replacement purposes or as original equipment, recommended for service where operation is continuous or where high initial heating speed is not primarily required.

They consist of Chromalox Ring Units of high-temperature sheath clamped into a grooved iron casting with monel metal screws or studs. Heating units are fully protected against grease or overflow of any other substance.

Write for Catalog No. 34.

Made for 120 or 240 volts; 660, 1000, 1200, 1500 or 2000 watts. 7 to 10¼ in. diam.

Specify voltage and wattage when making inquiries.

Hotel Range Unit—Rectangular Type

For heavy-duty hotel type ranges requiring a complete hot top regulated by 3-heat switches.

They consist of a box-shaped rectangular casting having six V-shaped contact points which can be filed down to adjust upper surface of plate perfectly level with adjacent plates and frame of range. Under surface of plate has four grooves into each of which is clamped a Chromalox Strip Heater by heavy cast iron clamping plates.

Write for Bulletin CC-107.

Made for 120 or 240 volts; 1750, 3000, 3500, 4000 or 6000 watts.

Length, 12" to 28". Width, 9" to 18". Depth, 1½" to 2⅛".

Specify voltage when making inquiries.

Electric Ring Units

These complete, sturdy, circular heating units are for clamping to flat surfaces such as on the bottom of small tanks, boilers, vats, kettles, etc.

Standard Chromalox construction — will withstand severe usage. Easily installed. Write for Catalog No. 34.

Iron Sheath Type for Temperatures up to 750° F.—Wattages range from 75 to 1000. For 115 or 230 volt operation. Smaller sizes available in single heat; all others, 3-heat. Thickness, 9/32 in. Ranges of diameter: overall, 2½ to 11 in.; internal, ⅞ to 8½ in.

High-Temperature Sheath Type for Temperatures up to Approx. 1200° F. — Same data as for Black Heat Type above, except that wattages range from 125/150/200 to 1000/1500/1800.

When inquiring, specify definite wattage, voltage and whether single or 3-heat. Write for Catalog No. 34.

Ring Type Urn Heaters

Designed to meet all requirements where a heater can be placed underneath an urn or container in which material is to be heated. Also useful in laboratories as a retort heater. A central stud projects through the stem of the pedestal. By turning the pedestal, surface of heater can be brought in firm contact with bottom of container—a very efficient construction, as resistor is within 1/16 in. of contact surface. Heater is self-adjusting to bottom of container. Metal parts are chromium plated. Base is finished in attractive black crinkled lacquer.

Write for Bulletin CC-107.

Minimum height—5¾ in. Maximum height—9½ in.

120 or 240 volts; 1000 to 3000 watts; 7 to 11⅜ in. overall diam.

Specify voltage and wattage when making inquiries.

Chromalox Strip Heaters

Designed for general purposes wherever electric heat is used. The heating element is a nickel chromium ribbon embedded in a refractory material under heavy hydraulic pressure. Both terminals project from same side, permitting snug clamping of units to flat surfaces.

Standard with iron sheaths for use where the temperature of the unit will not exceed 500° F.; with high-temperature sheaths for use between 500° and 1000° F. Voltages of 115 or 230, wattages from 150 to 1500, each with exceptions in certain types.

Overall lengths, 4 to 96 in.

Specify voltage and wattage when making inquiries. Write for Catalog No. 34.

Immersion Heaters

Types M and CM—Type M is most economical for heating tanks, fluid in containers, or where direct heat energy is desired (remote switch control). Type CM is most convenient where approved wiring is required, being fitted with switch and combination terminal cover and outlet box for conduit or BX wiring.

115 or 230 volts; single or 3-heat. 500 to 6000 watts. Overall length: Type M, 10 5/16 to 50 in.; Type CM, 13 1/4 to 53 in. Fit openings tapped for 1 or 2-in. iron pipe. **Write for Catalog No. 34.**

Type BLS—For heating all types of electroplating tanks, heating barrels and drums of oil, grease and other compounds, where special low ratings are required. 115 or 230 volts. 450 to 4000 watts. Overall lengths, 12 to 56 in. Fit openings 1 1/4 to 2 1/2 in.

Heavy-duty Type—Suitable for 4000 to 12,000-watt services.

"Quick-Order" Hot Plates

Single and Two-Burner types; ideal quick-heating equipment for lunch rooms, soda fountains, wayside stands, etc. Equipped with Chromalox Super-speed Range Units for 3-heat operation on 120 or 240 volts. The 2-in-1 burner has small inside unit for quick cooking with small utensils. Both units operate on "high"; inside unit only on "medium." Clean, fumeless heat.

Elements are fully enclosed, shockproof and safe. Smooth, flat top of chromium alloy. Heavy cast iron frame, heavy white enameled finish.

Single Burner: 5 x 11 x 13 in. deep (including switch); approx. net weight, 13 lbs. **Two-Burner:** 5 x 21 x 13 in. deep (including switches); approx. net weight 25 lbs.

Ask for Bulletin CC-107.

Single-Burner Plates		Double-Burner Plates			
Catalog No.	Wattage	Catalog No.	Wattage		
			No. 1 Burner	No. 2 Burner	Total
*SB-1000	1000	*TB-2000	1000	1000	2000
SB-1200	1200	TB-2400	1200	1200	2400
SB-1500	1500	TB-3000	1500	1500	3000
SB-2000	2000	.....	....	....	....

* Supplied for 120 volts only; all others for 120 or 240 volts.

Heavy-Duty Hot Plates

Provide smooth, flat, solid surfaces for all commercial cooking requirements. Heavy-duty Chromalox strip heaters or ring units are clamped to underside of plate —easily replaceable. Cast iron top plate cadmium-plated. All types have 3-heat switch. Two types: **Round**—5 in. high; **rectangular**—5 to 8 in. high.

Chromalox Electric Unit Heater (Blower Type)

Highly efficient for heating rooms, offices or any hard-to-heat place. Also much used for auxiliary heating. Designed for wall mounting (portable type also available); finished in art style bronze; very quiet in operation. For 115 or 230 volts, 60 cycles, A. C.; six sizes, 1.5 Kw. to 4.5 Kw., with or without automatic temperature control. Other types with or without the fan or blower in capacities from 250 watts to 40 Kw. **Write for Catalog No. 34.**

SPEED-UP! OLD RANGES

WITH CHROMALOX SUPER-SPEED "TOP-BURNERS"

Chromalox Super-Speed Replacement Range Units—Adaptor Type

U. S. Patents 1614330, 1614331, 1706015, 1706016, 1706017

Other Patents Applied for

Chromalox Super-Speed Units — Sizes: 1000, 1200, 1500 and 2000 watts. Range unit assembly complete, consisting of heating units with outside adaptor rings, installed to modernize and rejuvenate a range. Pliers and screwdriver the only tools required.

Write for Bulletin CC-107.

Sizes to Fit All Makes of Electric Ranges

Heats Quicker and More Efficiently—Operates at red heat, heating faster, more efficiently and more economically than other units of equal rating.

Modernizes Any Range in 15 Minutes—Simply take out old element, slip in and connect Chromalox Super-Speed Unit—no fuss or muss.

Longer-lived, Safer Construction—The patented embedded construction, and other Chromalox features, insure unusually long operating life with original heating qualities maintained undiminished.

Easily Cleaned—The heating surface is of chromium alloy, smooth and flat. The bright reflector is quickly removable, easily cleaned.

Be Sure to Specify "Chromalox-Equipped" for New Ranges—Range manufacturers will be glad to comply because they know that Chromalox Super-Speed Units are a positive assurance of cooking efficiency and economy.

THE ALUMINUM COOKING UTENSIL CO.

New Kensington, Pa.

Oakland, Calif.

BRANCHES

Baltimore, Md. Boston, Mass. Chicago, Ill. Cleveland, Ohio Kansas City, Mo. Minneapolis, Minn. New York, N. Y. Philadelphia, Pa.

"WEAR-EVER" GAS HEATED STEAM-JACKETED KETTLE

This kettle is ideal for use where cooking must be done for a large number of persons, but where steam is not available the year 'round. It will do everything expected of a regular Steam-jacketed Kettle operated on a steam line.

About 60 minutes are required to bring water to boiling point and create steam in the 60-gallon size of this type kettle. Made in seven sizes from 15 to 60 gallons capacity.

"Wear-Ever" regular steam-jacketed kettles which can be operated with steam or electricity are available in sizes from five to 300 gallons capacity.

"WEAR-EVER" ALUMINUM TRAY

This is the tray that is used so extensively for cafeteria service. Hard, thick sheet aluminum, it withstands knocks and bangs of hard service. Comes in 8 sizes—natural or Alumilite finish.

"WEAR-EVER" RANGE UTENSILS

The "Wear-Ever" line of heavy-duty aluminum ware includes everything needed in the form of range utensils—sauce pans, sauté pans, stock pots, etc.—all made of thick, sheet aluminum, every utensil stamped from single piece of metal without joints or seams and with extra thickness of metal where needed to resist wear.

For full information regarding these range utensils, see your regular supply house, or write for catalog.

"WEAR-EVER" PITCHERS WITH COOL HANDLES

permit easy and comfortable handling of hot liquids. Of course they are suitable for use with all kinds of liquids. These pitchers are available in capacities from one to five quarts.

There is a comprehensive "Wear-Ever" booklet on heavy-duty aluminum ware. It is FREE. Send for your copy. Address: THE ALUMINUM COOKING UTENSIL COMPANY, 11TH STREET, NEW KENSINGTON, PA.

H. W. BAKER LINEN CO.

315–317 Church St., New York

BRANCH OFFICES

Atlanta 57 Lafayette Dr.	**Chicago** 7 So. Dearborn St.	**Minneapolis** 215 So. Ninth St.	**Los Angeles** 8th and Los Angeles Sts.
Boston 78 Chauncy St.	**Cleveland** 1861 East 87th St.	**Philadelphia** 406B Denckla Bldg.	**San Francisco** 420 Market St.

TOWELS, BLANKETS AND LINENS

For the School Gymnasium, Dormitory and Cafeteria

We Recommend SAMPSON Towels for School Use Because:

1. They are made in accordance with rigid Baker Linen Company specifications.
2. They are the strongest towels made.
3. They are luxuriously soft and extra-absorbent.
4. They have no fear of the laundry.
5. They keep your operating expenses low—by their years of satisfactory service.

TABLE LINENS
Imported and Domestic
Plain and Crested
Cloths—Napkins
Tops—Damask
Table Pads
Doilies—Tray Covers
Scarfs—Squares
Colored and Block Prints

TOWELS
Bath—Face
Hand—Doctor
Dish—Glass
Kitchen—Cooks
Operating
Cotton—Union—Linen
Plain and Name
Woven as desired

BED LINENS
Sheets—Pillow Cases
Spreads—White, Colored
Mattress Pads and Covers
Blankets—White, Plaid
Colored—Single, Double
Throw Blankets
Camp Blankets
Crew Blankets

MISCELLANEOUS
Curtains—all kinds
Shower Curtains
Pin Cushions
Pin Cushion Covers
Uniforms—Coats—Aprons
Hospital Gowns and Garments
Piece Goods

Sheets, Bedspreads, Blankets

Your attention is specially called to our high-grade line of cotton sheets—with their satin-smooth finish, long wear, lower replacement costs, and lower first cost. Investigate our blankets and bedspreads, too . . . widely used by the most careful buyers.

Linen, Union, and Cotton Towels

All grades can be furnished from stock in various sizes. The name of your school will be woven in color or white on special order.

GREAT NECK PUBLIC SCHOOLS
GREAT NECK, N. Y.

H. W. Baker Linen Co.
315-317 Church St.
New York City.

Gentlemen:—
Three years ago the Board of Education bought considerable number of your towels and they are still holding out. I have yet to find one that shows the effects of wear and report that they are the best that I have ever been able to buy in my twenty years of service in physical education.

Sincerely yours,
(Signed) Irving E. Brown.

Table Linen

We carry not only a large line of imported linens which have been considered among the most attractive and economical in the market, but also cotton table cloths to meet any price, in both staples and novelties.

Write for illustrated circulars.

Since 1848 **THE G. S. BLODGETT CO., INC.** Since 1848

Burlington, Vermont

BLODGETT'S NEW GAS OVENS

Especially Suitable for School Kitchens

THE BAKER-ROASTER COMBINATION OVEN

2 in 1

Two separate ovens in one; each compartment having separate burners, and each compartment having its own automatic heat control.

FEATURES:

1. Large roasting requirements can be handled in the No. RB-15 or R2-15. At the same time baking can be done. Such flexibility saves time in the working schedule of kitchen employees.
2. Different work can be done at the same time at different temperatures in the two independent compartments.
3. Only capacity needed is used. At times when baking or roasting requirements are light, it is only necessary to use one compartment; thus one-half the amount of gas.
4. Better, higher-class work can be turned out on these ovens, because they bake uniformly — eliminates constant watching and shifting of goods, thus saving operator's time.
5. Solid, thick insulation and automatic heat control reduces gas consumption, makes for cooler workshop and takes the guesswork out of baking and roasting.

CONTROL YOUR COOKING OPERATIONS

Save with *GAS* — the Better Fuel

THE AMERICAN SCHOOL AND UNIVERSITY

THE BUCYRUS COPPER KETTLE WORKS CO.

BRANCH
105 Liberty St.
Brooklyn, N. Y.

Bucyrus, Ohio

BRANCH
923 E. Third St.
Los Angeles, Calif.

The Bucyrus Copper Kettle Works Company offers a variety of cooking kettles to suit the requirements of any school kitchen, both as to size and price. These kettles are made of copper, nickel, stainless steel or aluminum, in all common sizes, and many installations of kettles of each metal are giving satisfactory results. Yale University has equipped all of its kitchens built in the last few years with Bucyrus Nickel Kettles; the U. S. Navy Department has given us many orders for Aluminum Kettles. All these kettles undergo rigid inspection, and so complete and careful is our workmanship that every kettle has passed this inspection.

Stationary Steam Jacketed Kettle
5 to 250 gallons

We build the standard STEAM JACKET KETTLE of these metals in many standard sizes, in either the stationary or tilting type. All have large steam jackets for quick heating, and all are finely finished to compare with the other modern equipment of the up-to-date kitchen. The CEREAL COOKER is made of any metal, and of either the permanently assembled type shown or with the lift-out cereal container.

Urn
20 to 150 gallons

The institution type COFFEE URN in copper, aluminum, or pure nickel is in wide use where large amounts of coffee or tea are wanted. With a Bucyrus Urn coffee can be made from the cold water in thirty minutes.

THE GAS HEATED STEAM JACKETED KETTLE is the result of forty-six years of experience in the design and construction of kettles of this type. The improved gas burner gives a maximum of heat with minimum consumption of gas.

The Administration Building at the "Century of Progress" in Chicago installed one of these Bucyrus Kettles when they began operations several years ago, and many public and private institutions and schools throughout the country have them in use.

Gas Heated Steam Jacketed Kettle
10 to 100 gallons

Write for catalog of our kettles, and remember that we supply your requirements in any metal you want. Your Supply House can furnish Bucyrus Kettles, or they can be secured direct from our factory or branches.

Full Jacketed Steam Jacket Kettle
5 to 150 gallons

Cereal Cooker
10 to 100 gallons

Tilting Steam Jacketed Kettle
5 to 100 gallons

Steam Jacketed Kettle for Diet Kitchens
2 to 40 quarts

CHAMPION DISHWASHING MACHINE CO.

Main Office and Factory

Erie, Pennsylvania

CHAMPION DISHWASHING MACHINES

For school and college cafeterias and kitchens, from the largest to the smallest, the Champion Dishwashing Machine Company offers a wide range of models from which to select that model which will meet requirements as to size, capacity, speed, finish and price. Capacities range from 2,500 to 21,000 pieces per hour, and the price range is from $350 to $3,300.

The New Series One CHAMPIONS

These New CHAMPIONS have been built bigger, better, heavier, all the way through—matching, or surpassing, point for point, any other dishwashing machine made, and having many other valuable features besides. Made with a cast iron tank—the most rigid, durable, sanitary water container that can be put into a dishwashing machine—with more spray pipes, a larger pump, a larger motor, larger racks, and a larger washing chamber—these are only a few of their outstanding features!

Model 1-SD4 illustrated at the right is the most popular of the Series One CHAMPIONS—sturdy, compact, complete—designed particularly for the small kitchen where every square foot of open space must be carefully conserved. Special features include automatic overflow—outside drain control; new solid cast base; adjustable feet, and the new special wash control.

Specifications: — Single tank. Floor space 27″ x 27″. Height: closed, 59″; open, 69½″. Motor, ¾ hp. Capacity, 4,000 pieces per hour. Shipping weight, 775 pounds. Furnished with 4 assorted racks. Equipped with either steam injector or gas burner.

Advantages Common to All CHAMPION Dishwashing Machines

Longer life—owing to the heavier, stronger materials used.

Larger capacity—due to the greater washing speed, which in its turn is due to more efficient pump and spray distribution system.

Greater accessibility—all parts within easy reach of the operator.

Lower costs—they are built better, even though they cost no more, and the first cost is practically the entire cost.

Easier operation—every part designed to simplify the washing work—to save time and trouble for the operator.

Also many other features that make dishwashing easier, quicker and less costly. Write for illustrated circular.

Information concerning larger-capacity machines, such as the CHAMPION Rack Type Automatic Machine and CHAMPION Belt Conveyor Type is also available on request.

MODEL 1-SD4
CHAMPION

DOEHLER METAL FURNITURE CO., INC.

DORMITORY CAFETERIA BEDROOM RESTAURANT INFIRMARY CHAIRS

General Offices: 192 Lexington Ave., New York City

Durable

Doehler metal furniture is sturdily built from heavy gauge steel. It is specially designed to withstand the hard use and abuse of institutional routine. Its strength does not diminish with the years.

The newly developed "Dohlite" finish, fused on the metal at high temperatures, withstands cracking, chipping, loosening and softening whether from heat, water, flame or hard knocks. It makes the furniture almost indestructible.

Sanitary

Doehler metal furniture is always fresh and clean. The all-metal construction offers no attraction for vermin, dirt or germs. It does not retain odors. The polished surfaces require little attention to keep them neat and spotless. Scrubbing and washing will not affect the waterproof finish.

Doehler metal furniture will not suffer from periodical disinfecting or fumigating. Its widespread use in hospitals is ample evidence of its sanitary qualities.

Economical

Doehler metal furniture is highly economical, both in original cost and in upkeep. It is priced well within the reach of the most modest budget. Doehler prices compare favorably with those of ordinary wooden furniture. The usual heavy costs of repairs and maintenance are practically eliminated due to the sturdy construction and super-durable finish of Doehler equipment.

Attractive

The charm of Doehler designs has given an entirely new meaning to "metal furniture." It is produced in conservative period designs as well as in the contemporary mode. Offered in a wide choice of finishes including natural reproductions of walnut, mahogany and maple. The color finishes are tastefully developed in ivory, grey, green, etc. Doehler metal furniture remains neat and attractive indefinitely. It never looks shabby or worn.

Comfortable

Doehler metal furniture is thoroughly comfortable. Regardless of climatic conditions, it offers perfect service—the drawers never jam, no glued joints to loosen, no veneered surfaces to crack. May be placed anywhere without damage — near open windows or next to steam radiators. Doehler furniture is comfortably silent. Drawers glide quietly on slides. They are cushioned by rubber bumpers. All other parts thoroughly sound-deadened.

All Purposes

Our standard lines include metal furniture and equipment for dormitories, bedrooms, infirmaries, cafeterias, offices, etc. If specially designed pieces are required, we welcome an opportunity to co-operate with you. We can serve you advantageously—quality equipment at very favorable prices. This is clearly proven by the large volume of competitive government business we enjoy.

Write for Illustrated Catalogs and Complete Details

EDISON GENERAL ELECTRIC APPLIANCE CO.

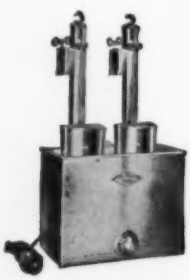
5600 West Taylor St.
Chicago, Ill.

Put Your KITCHENS ON A Scientific Basis

Only one form of cooking heat is worthy of school use. It is the heat which is clean, dependable, fast. It is the heat which is scientifically accurate and correct. It is efficient Calrod heat, possible only in General Electric Edison kitchen equipment.

Edison Electric cooking and baking installations are economical, not merely in operation, but in saved time, uniformity of result, and better food flavor. Vegetable minerals and vitamins are retained, and diets hold their natural food coloring. Health-giving elements lost in ordinary boiling, nourishing juices that bleed away in flame roasting, remain to tempt students' appetites.

Automatic temperature control, with which all Edison installations are equipped, eliminates kitchen guesswork and assures correct cooking heat. With current actually on only a fraction of cooking time, you gain not only the economy of low operating cost, but the saving that comes with exact certainty of method.



This Automatic Egg Boiler, thermostat-controlled, cannot burn out. Current shuts off automatically when water boils dry. Use your old timers if you desire

This Utility Range is especially adapted for diet kitchens or for small hospital kitchens, where saved space is a requisite. It requires no extra ventilation

EDISON GENERAL ELECTRIC APPLIANCE CO.

5600 West Taylor Street, Chicago, Illinois

THE AMERICAN SCHOOL AND UNIVERSITY

***Features* like these put your kitchen on a scientific basis. Ask your kitchen equipment jobber. Or write us—**

EDISON

This Horizontal-Type Broiler produces 36 two-pound steaks per hour. Convenient and clean

The Ad-A-Deck Bake Oven bakes at 3 different temperatures at once. Used by many thousands of professional bakers

This Roasting Oven pays for itself in less meat shrinkage. The oven shown has one deck added

This Heavy Duty Range has cooking surface of twenty-four square feet with four hot plates, each separately controlled. The Calrod units are practically indestructible

This Automatic Counter Fry Kettle turns out delicious perfectly fried foods, with savings in food and fuel cost

FAULTLESS CASTER CORPORATION

Evansville, Indiana

FAULTLESS CHAIR CASTERS

In the office, the library, the study rooms, Quiet is a golden virtue. Faultless Casters are designed for quiet, smooth operation. Faultless Casters swivel quickly and with minimum effort. For the user, they make possible greater efficiency and contentment. Sturdy construction assures years of economical service. The special double ball bearing swivel caster featured here is finished in oxidized copper to harmonize with any furniture.

RUBEREX (SOFT TREAD) WHEELS, OXIDIZED COPPER FINISH

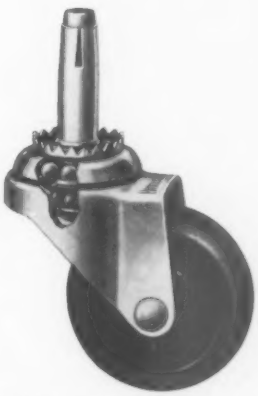
Style Number	Wheel Dia.	Height, Floor to Track Plate
2478	1⅝	2⅛
2479	2	2½

ROCKITE (HARD TREAD) WHEELS, OXIDIZED COPPER FINISH

2778	1⅝	2⅛
2779	2	2½

NOELTING
FAULTLESS
CASTERS

Look for the Faultless name on chair casters. Have confidence in their quality



Notice the double row of polished and specially hardened ball bearings which assures quick swiveling, effortless movement and absolute quiet. The wide shoulder with center of gravity offset at such great distance from the wheel is another Faultless feature that makes for positive swiveling. Dust proof construction.

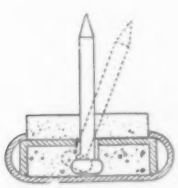
FAULTLESS CUSHION CHAIR GLIDES

Faultless Cushion Chair Glides give double protection. The live rubber insulation protects against jars and vibration; the smooth rounded edges of the glide protect floors from being marred.

Faultless Cushion Chair Glides are offered in three sizes. They are sturdily built of formed hardened steel and will outwear the chairs on which they are used. They are finished in oxidized copper to harmonize with any style of furniture.

Cushioned in Rubber

Notice the diagram at the left showing the manner in which Faultless Cushion Chair Glides are constructed. The glide is braced by an inner steel frame, providing unusual strength. Live rubber inside the glide and at the top acts as a cushion and shock absorber, and permits the necessary flexibility which gives Faultless Cushion Chair Glides their long wearing qualities.



Made in Three Sizes:
NRS—¾" Diameter
NRS—1 1/16" Diameter
NRS—1¼" Diameter

FRIGIDAIRE CORPORATION

Subsidiary of General Motors Corporation

Dayton, Ohio

"THE WORLD'S BEST KNOWN NAME IN ELECTRIC REFRIGERATION"

Frigidaire, a product of General Motors, builds the most complete line of electric refrigeration equipment in the world. There are household models for the largest or smallest kitchen—Frigidaire coils and compressors for all types of refrigerated cases, walk-in boxes and special installations — Frigidaire water coolers—beverage and soda fountain coolers for sweet and carbonated water and fruit drinks and self-contained bottle coolers—Frigidaire Air Conditioning equipment for schools, hospitals and offices—Frigidaire equipment for whatever your refrigeration problem may be.

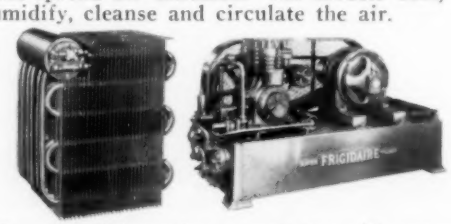
You are invited to make free use of Frigidaire engineering and technical facilities for assistance in solving refrigeration and air conditioning problems. Specific data and comprehensive literature will be gladly furnished upon request. Write to main office, Dayton, Ohio, or consult the local Frigidaire dealer.

Frigidaire household models range in size from 2.1 cu. ft. to 18.3 cu. ft.—models finished in durable Dulux and in porcelain-on-steel outside and in. Models with Automatic Reset Defrosting, Frigidaire Cold Control, Automatic Ice Tray Release, giant Hydrators and many more features of proved economy and convenience which have sold **more than 1,250,000 more Frigidaires than any other make.**

★

Frigidaire builds a complete line of water cooling equipment in models of varying capacity to meet every conceivable need. There are self-contained models for bottled or running water and tank-type models for circulating or multiple systems. They are entirely automatic and can be depended upon regardless of weather.

Frigidaire and General Motors have put air conditioning on a practical, economical and reasonable basis. Completely self-contained units —cabinet models for connection to remote compressors—cooling coils and fans in housings which have outlets scientifically designed for wide-spread air diffusion. All models cool, dehumidify, cleanse and circulate the air.



Correct refrigeration to meet the wide range of refrigeration requirements cannot be obtained with one type of equipment. Therefore, to meet this need Frigidaire engineers have designed the most complete line of coils and compressors to meet any refrigeration need. There are Frigidaire Flowing Cold Diamon-Fin Units, Forced Air Units, Flooded Units, Dry Expansion Units and Liquid Cooling Units. In addition to furnishing ideal temperatures suited to individual needs, this Frigidaire equipment automatically eliminates excessive dehydration, prevents objectionable sliming or sweating of meats and provides the utmost in cleanliness by washing the air as it circulates in refrigerators, cases, coolers, etc. It is the completeness of the Frigidaire line that makes possible the application of Frigidaire Flowing Cold to every type of requirement whether it be large or small.

GENERAL ELECTRIC COMPANY

COMMERCIAL REFRIGERATORS AND UNITS, DOMESTIC CABINETS, RANGES AND DISHWASHERS, WATER COOLERS

Specialty Appliance Sales Dept., Section BU, Nela Park, Cleveland, Ohio

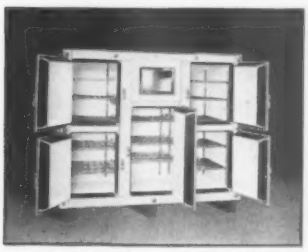
● General Electric equipment for institutions includes water coolers, commercial refrigerators, domestic refrigerators, commercial condensing units and cooling units, ranges, and dishwashers.

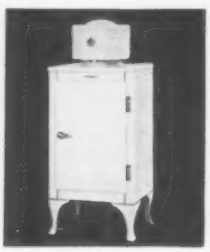
Self-Contained Water Coolers

WATER COOLERS

G-E water cooling equipment consists of individual self-contained bottle and pressure coolers, cafeteria coolers and necessary equipment for multiple installations. Self-contained coolers are equipped with a condensing unit, cooling compartment and faucet or bubbler housed in one all-steel cabinet. Installation of this type cooler is accomplished by merely plugging into an electrical outlet.

Cafeteria coolers are available in various sizes and can be installed as a self-contained cooler, remotely connected to a condensing unit, or in a multiple hook-up where one or more coolers are refrigerated by a remote condensing unit. Cafeteria coolers are equipped with glass racks and glass filling faucets.





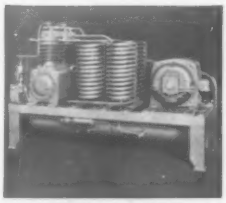
Commercial and Domestic Cabinets

COMMERCIAL REFRIGERATORS

Various standard sizes of commercial refrigerators are available equipped with General Electric refrigerating units. These refrigerators can be obtained fitted for bakery storage, meat storage, salad and short-order service and are adaptable for practically any type of cafeteria or restaurant service required. Smaller cabinets of domestic size are also available in the famous Monitor Top design or conventional Flat-top style. Commercial Refrigerators range in size from 27 to 130 cu. ft. net. Domestic refrigerators are available in sizes ranging from 4 to 18 cu. ft. net capacity.

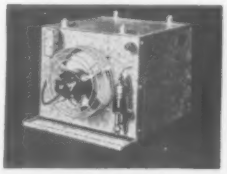
COMMERCIAL CONDENSING UNITS AND COOLING UNITS

Refrigerating equipment for all types of commercial refrigeration is available. Eleven condensing units using motors ranging in size from 1/5 to 20 H. P. offer a wide selection in capacities. These units can be obtained in air cooled or water cooled models using Sulphur Dioxide or Freon as a refrigerant.



Condensing Unit

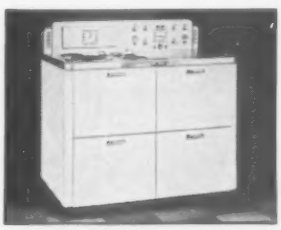
Cooling units, for use with G-E condensing units, are available in Conditioned Air, ice freezing, finned coil or immersion type. The combination of condensing unit and cooling unit can be used for walk-in coolers, storage cabinets, water cooling, milk cooling, ice freezing and other similar types of installations.



Cooling Unit

RANGES AND DISHWASHERS

General Electric Ranges are available in various models all equipped with the famous Calrod unit. These ranges when used in combination with the General Electric Dishwasher offer ideal set-ups for the preparation of foods.



Range

General Electric Dishwashers can be obtained in individual models and sink and drain board combinations for built-in installations, or equipped with leg or base type cabinets.

Dishwasher

For further information on refrigeration or kitchen appliances write to the General Electric Company, Specialty Appliance Sales Department, Section BU, Nela Park, Cleveland, Ohio.

HARD MANUFACTURING COMPANY

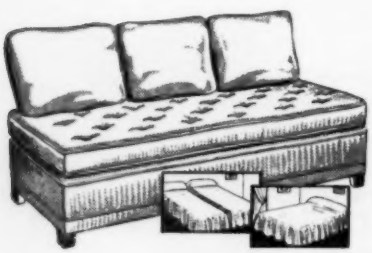
Buffalo, N. Y.

Nearly sixty years of manufacturing experience has brought our line of Steel Beds, Springs, Mattresses, etc., to a commanding position in the trade. Our brand LIFE LONG was adopted many years ago as appropriate because the constant endeavor has been to produce better goods which would give more years of service. Any buyer will agree that the ultimate cost is not first cost, but yearly cost and we guarantee the lowest cost on this basis.

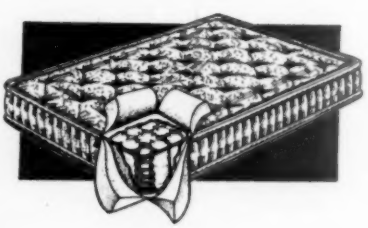
For the first time we are entering the college and school field, offering the following lines all made in our own plant:

Steel Dormitory Beds
Steel Hospital Beds
Steel Double Deck Beds
Steel Cots
Spiral Springs and Link Springs
Box Springs
Mattresses and Pillows
Studio Couches

Steel Dressers
Steel Desks
Wardrobes
Costumers
Steel Chairs of every style
Easy Chairs
Desk Chairs
Dining or Cafeteria Tables



We ask for inquiries on above and similar equipment and offer our services for planning and equipping new installations and also for renovating, refinishing and modernizing old furnishings



THE AMERICAN SCHOOL AND UNIVERSITY

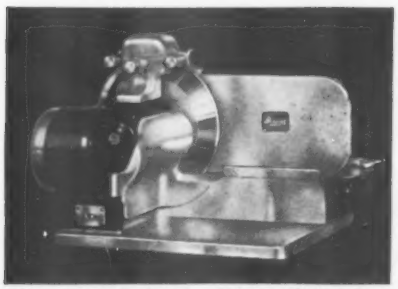
THE HOBART MANUFACTURING CO.

Makers of Electric Food-preparing and Dishwashing Machines

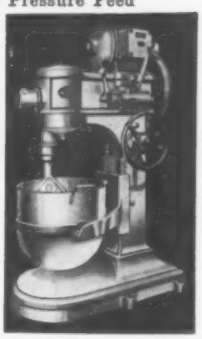
Troy, Ohio

New York Office, 45 E. 27th St., near 4th Ave. Chicago Office, 308 W. Randolph St.

SALES AND SERVICE OFFICES IN ALL PRINCIPAL CITIES Sold Through Leading Kitchen Outfitters



The newest design in Hobart Slicing Machines. Latest in performance, speed, safety and sanitation. Adjustable Pressure Feed



Hobart-Crescent XM Glass and Dishwasher, at left. The smallest automatic washer ever built. Fits into small space. Has Dual-Drive conveyor. Many other models.—At right, Hobart M-80 Super-Mixer with bowl capacity up to 110 quarts. Various sizes take the Air Whip attachment (see below)

HOBART MIXERS are built in 3, 5, 10, 12, 15, 20, 30, 40, 60, 80 and 110-quart Bowl Capacities. A model for any size kitchen. They mix, beat, whip, blend, mash. With attachments they chop, grind, slice, shred, grate, crumb, sieve, strain, etc.

The Air Whip Bowl, or attachment, for Hobart Mixers only, now adds even more to the value of these machines. Supplies new aerating advantages important in cake making, improving texture, taste and keeping quality.

The Hobart Electric Ball Bearing Slicing Machine combines the newest, most improved features in **one** machine. Ideal for boneless meats, raw or cooked, bread, cheese, vegetables, fruits, etc. Special Kitchen Feed Trough. The only slicers with adjustable pressure feed.

Hobart-Crescent Glass and Dishwashers are made in a wide range of automatic and semi-automatic models to meet the demand for any capacity. They give sparkling cleanliness and a high degree of sterilization. Noted for such exclusive features as revolving wash arms and patented Dual-Drive conveyor. Also complete line of Brush Type Glasswashers.

The Hobart Air Whip makes 3 or more quarts of whipped cream from 1 quart of liquid cream in a few seconds. Whips by **Air,** keeping all the freshness and sweetness of the cream. More and better whipped cream at less cost.

Hobart Potato Peelers are made in 3 sizes, with capacities from 15 to 45 lbs. peeled in 90 seconds. Negligible peel loss. Can also be used for sweet potatoes, carrots, parsnips, turnips, etc.

Hobart Food Cutters, with latest features, cut meats, vegetables, fruits, nuts—practically anything in the food line, uniformly, in a few seconds' time.

Guarantee and Service. Hobart Machines are built by the World's Largest Manufacturers of Electric Kitchen Machines—even to the motors. An advantage to the kitchen standardizing on Hobart Equipment is that all Hobart Machines are guaranteed and serviced by **one** nationwide organization. This saves uncertainty, inconvenience and confusion. Further particulars on request without obligation.

The New Hobart Air Whip revolutionizes cream whipping

Hobart Potato Peelers pay as they peel, quickly

Every kitchen should have this low-priced Hobart Food Cutter

THE LAWRENCE COMPANY

170 Summer Street
Boston, Mass.
Telephone: Liberty 9032

We are offering *Pure Wool* Blankets in the following colors:

Blue Rose Green Tan
Orchid Peach — Also White

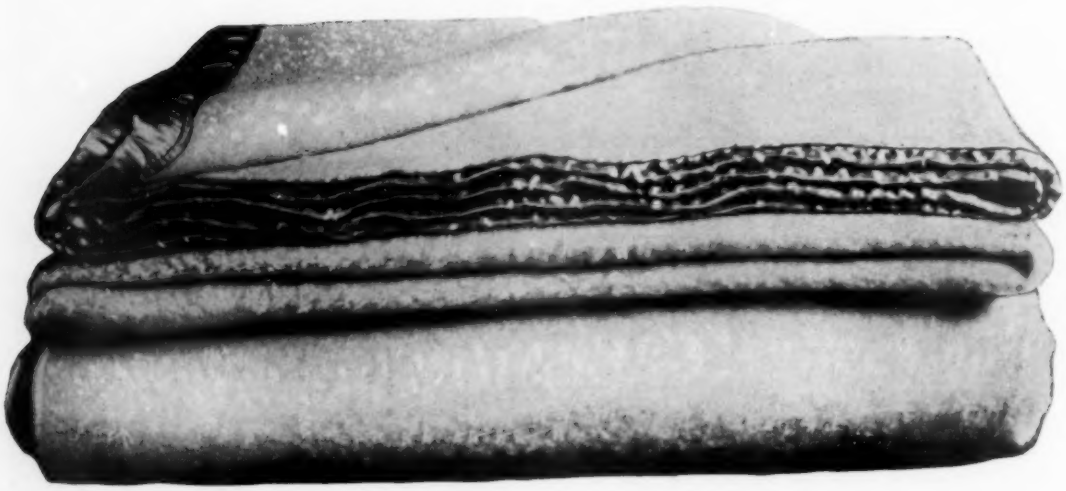
Size: 72″ x 84″—Standard size for a full bed

Size: 60″ x 84″—Standard size for a three-quarter or twin bed

We can have these Blankets made in any size you may desire.

These Blankets are made of Pure Wool and are bound on two ends with the best of Satin ribbon.

Write us for quotations and we will be pleased to send sample Blankets for your examination. If they are not suitable for your requirements, you may return them Express Collect.



REPUBLIC STEEL CORPORATION

General Offices: Youngstown, Ohio

CENTRAL ALLOY DIVISION: MASSILLON, OHIO

SALES OFFICES AND DISTRIBUTORS IN ALL LARGE CITIES

ENDURO
REPUBLIC'S PERFECTED
STAINLESS STEEL

Licensed under Chemical Foundation Patents Nos. 1,316,817 and 1,339,378

The application of Enduro, Republic's Perfected Stainless Steel, in schools and universities, relates to (a) its use as a decorative medium, exterior and interior, (b) its use wherever food comes into contact with metal, as in kitchen and cafeteria equipment, and (c) its use in laboratory service, in furniture and in vent hoods and ducts.

Enduro Stainless Steel is an alloy containing nickel and chromium, a beautiful lustrous, silvery metal in the polished state. It is the same corrosion-resisting metal all the way through with no surface coating to peel off or wear thin. It is impervious to the action of weather and is not subject to attack by most acids, alkalis, fumes, foods and dairy products. Wiping with a damp cloth restores the original silvery finish.

Its use as a decorative material is limited only by the imagination of the architectural designer. It can be used as trim around rooms, doors and windows, for kick-plates and mop-board mouldings, in stair rails, in lighting fixtures, in grilles, in spandrels, in many ornamental features, exteriors and interiors. And any ornamental metal worker can fabricate it.

The advantages of Enduro in food service are its beauty, the ease with which it may be kept clean, and its long life due to the fact that it is proof against corrosion. It is available in many fabricated utensils — pans, kettles, pressure cookers, etc.—and it is supplied in sheet form for fabrication into racks, table tops, shelves, etc. A list of manufacturers using Enduro in the making of such equipment will be supplied upon request.

On account of the ability of Enduro to resist nearly all acids, alkalis and corrosive gases, it is ideal for laboratory equipment —hoods, ducts, cabinet shelves, tops of tables, desks, etc. Any sheet metal worker can fabricate hoods and ducts and similar parts on the job.

ENGINEERING SERVICE

The facilities of the largest and best equipped metallurgical laboratories in America, together with the experience and skill of a trained corps of Republic Metallurgists and Engineers, are at your service in working out any problem relating to the use of or fabrication of Enduro. Tell us your problems.

1. Union Entrance of the University of Minnesota, St. Paul, Minn., fabricated of ENDURO by Stanley Iron Works, Inc., Minneapolis, Minn.

2. ENDURO equipped cafeteria, fabricated by Kirk Mfg. Co., installed in Hadley Vocational School, St. Louis, Mo.

3. All table tops, counter tops, backs, shelves and tray rails in James Ford Rhodes High School, Cleveland, O., are ENDURO. Counter tops are ENDURO Plymetl made by Haskelite Corp

4. A beautiful stainless staircase of ENDURO

5. ENDURO Met-L-Wood table tops, made by Met-L-Wood Corp., Chicago, Ill., installed in Domestic Science Room, Parker Junior High School, Chicago.

2

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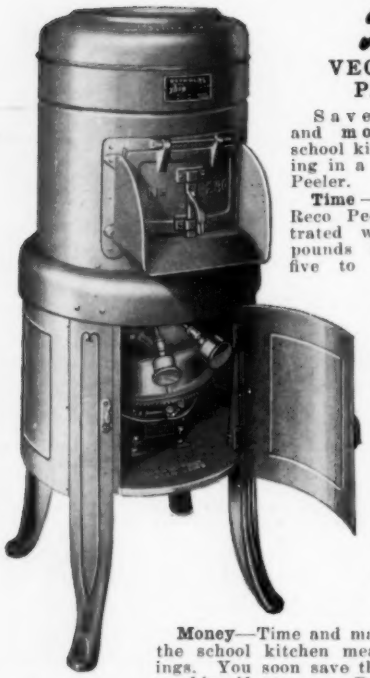


Reco

VEGETABLE PEELER

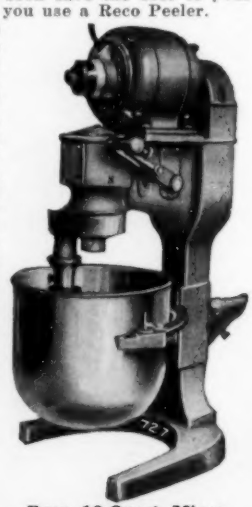
Save time, material and money in your school kitchen by investing in a Reco Vegetable Peeler.

Time — The No. 230 Reco Peeler here illustrated will peel 150 pounds of potatoes in five to eight minutes. Compare this with hand-peeling!

Material — The waste of material by hand-peeling amounts to 25-30%, while by machine it is 10% or less. This is because the machine peels by abrasion, rubbing off the skins only and saving the edible portion of the potato or vegetable.

Money—Time and material saved in the school kitchen means money-savings. You soon save the cost of your machine if you use a Reco Peeler.

The body, as well as the revolving disc of the Reco Vegetable Peeler, is lined with a special abrasive consisting of a mixture of quartz, sand and cement which retains its sharpness and lasts for years. Operation is easy and simple. Vegetables are loaded and discharged while the motor is running. Minimum floor space is required — only 19 x 19 inches for the model shown above. A stream of fresh water washes the vegetables constantly as they are being peeled, and all skins and foreign matter are flushed out through the drain.



Reco

12-QUART MIXER

What It Can Do	
Mash	6 lb. potatoes
Mix	7 qt. mayonnaise
	1½ lb. marshallow icing
	12 lb. bread dough
	11 lb. pie dough
	6 lb. sponge cake batter
Whip	2½ qt. cream
	1½ pt. egg whites
	1 pt. meringue

Beat, Stir, Chop, Slice, Strain, Grate, Crumb, Freeze.

Reco 12-Quart Mixer Height 30"; base 12" x 12". Two speeds (without stopping motor to shift). ⅓-hp. Reco motor A. C. or D. C. Finish—light gray enamel baked on. Price $115.

The Reco 12-Quart Mixer is furnished complete with 12-quart bowl and choice of any two beaters. Beaters include:

Spiral Whip — for cream, egg whites, etc.

Cake Beater — for mixing cake, mashing potatoes, etc.

Batter Beater—for creaming and rubbing.

Dough Hook — for mixing bread dough, etc.

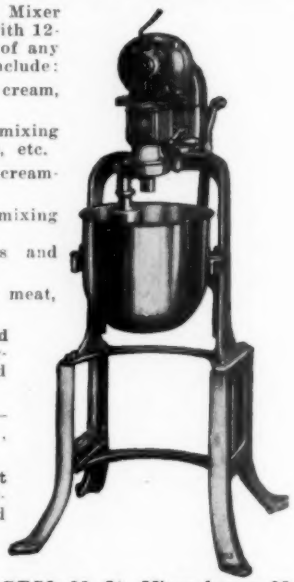
Optional attachments and equipment include:

Food Chopper — for meat, hash, etc.

Slicer, Shaver and Grater — plates interchangeable with food chopper.

Colander attachment—for straining soups, purees, etc.

Mayonnaise equipment—2-quart oil can, attachment socket and splash cover.



RECO 22 Qt. Mixer has a 22 qt. bowl and will handle almost double the capacity of the 12 qt. Height 55 inches. Leg base occupies 24" x 24" Space Price $160

PEELERS

Capacity, 30 pounds per minute—"Half-Bushel-a-Minute."—Price $200.

Other Models Are:

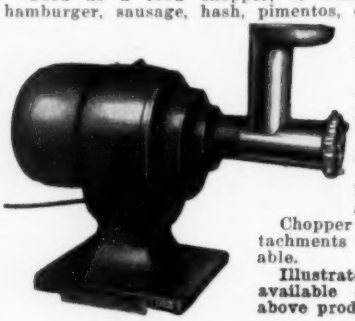
No. 215—"Peck-a-Minute" $140
No. 260—"Bushel-a-Minute" 285
Also hand-operated peelers for the smaller schools $30 up

Reco

COMBINATION GRINDER-SLICER

Price $55

Used as a food chopper, it will grind meat for hamburger, sausage, hash, pimentos, etc.



Used as a slicer and grater, it will—

Slice potatoes, cabbage slaw, onions, cucumbers, apples, etc.

Shave ice (fine or coarse).

Grate dry bread, crackers or any dry material.

Chopper and slicer attachments are interchangeable.

Illustrated bulletins are available on each of the above products.

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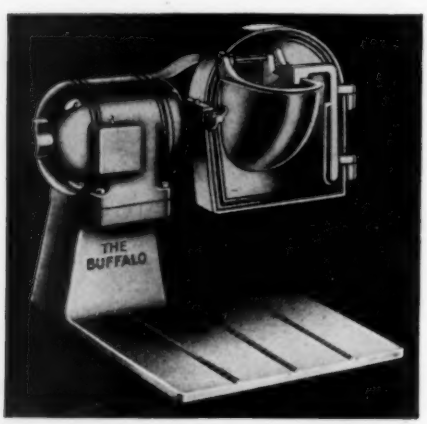
Manufacturers of "BUFFALO" Food Choppers, Vegetable Slicers and Bread Slicers

"BUFFALO" VEGETABLE SLICER (*Below*)

Model C is used for slicing all kinds of vegetables and fruits; grating cheese, bread crumbs; making French fried, Julienne potatoes; slicing or grating nuts. Makes uniformly thin potato chips. This slicer now used in many school kitchens. Can be equipped with five slicing disks and two different style fronts; also with grinder for producing fine cut hamburger, sausage meat, etc. ⅓ H. P. motor.



(Left) SENSATIONAL NEW "BUFFALO" SELF-EMPTYING FOOD CHOPPER

Model 120 is a perfect machine for large school kitchens. Chops all kinds of meat, fruits, vegetables, nuts, fine without mashing or squeezing out nutritious juices. The bowl is emptied automatically without touching the food. Produces better quality chopped foods, eliminates food waste, saves considerable time and labor. The cone-shaped plug fits into the opening in center of bowl, while food is being chopped. To remove food, raise the plug and lower the plow as shown in illustration. Simple, safe, sanitary. Easily cleaned.

Diameter of bowl, 20 inches. Capacity 20 lbs. of meat. Top plate can be removed; bowl not removable. 1 H. P. fully enclosed motor.

"BUFFALO" FOOD CHOPPER (*Below*)

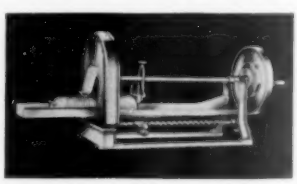
Model 114 is ideal for use in school kitchens. It is sturdily built, takes very little room; beautifully finished. Has exclusive safety features;

knives fully guarded; top plate and bowl removable. Has capacity of 7 lbs; ⅓ H. P. motor.

Both models 120 and 114 can be furnished with grinder or vegetable slicing attachments. "BUFFALO" Choppers also made in 4 other sizes. Write for complete catalog and prices.

"BUFFALO" BREAD SLICER

Automatically feeds the bread to the knife. Cuts 175 to 200 uniform slices per minute. Stacks as it cuts, keeping the bread fresh. Saves two to three slices on every loaf over hand slicing. This machine is most popular for school use. Made in three sizes, hand or motor operated. Write for catalog and prices.



LABORATORY AND SHOP

Recent Trends in Laboratory Construction, with Special Reference to Chemical Laboratories

BY C. R. HOOVER

HALL LABORATORY OF CHEMISTRY, WESLEYAN UNIVERSITY; CHAIRMAN, NATIONAL RESEARCH COUNCIL COMMITTEE ON LABORATORY CONSTRUCTION

IT IS obviously impossible, in an article of this nature, to attempt a thoroughgoing discussion, or even a summary, of the many problems involved in the construction of laboratories in general, or chemical laboratories in particular. Excellent discussions of special topics and of specific laboratories have appeared in recent editions of THE AMERICAN SCHOOL AND UNIVERSITY. A committee of the National Research Council recently published a lengthy report on chemical laboratory construction and equipment, and many individual laboratories have issued detailed descriptive pamphlets. Such sources should be consulted for more complete information.

Recently, the committee to which reference has just been made compiled the results of a lengthy questionnaire, sent out to each member of the committee and to others who are interested in laboratory construction. An examination of this compilation indicates that there is special interest in several details and a few general principles. Selections from this information will be in part the basis for this discussion.

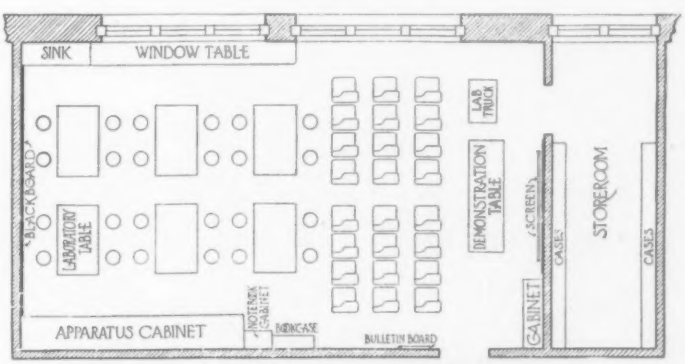
Some very glaring examples of the neglect of the fundamental nature of physical and natural science, in the construction of scientific laboratories, have been noted by members of this committee and commented upon in scientific periodicals. Such neglect impels the writer to attempt to review a few important and general considerations which should be well known.

Fundamental Considerations

The first of these is that a successful laboratory cannot be erected without the cooperative effort of those who are to use the projected laboratory, the architects and engineers who prepare the plans, and the administrative officers, building committees or boards who assume general responsibility. It is especially important that the architect and teacher, or the user of the laboratory, be familiar with trends and types of laboratory construction. General information of this nature can be secured without charge as suggested above; and much valuable, detailed and specialized information regarding equipment can be secured from manufacturers who have had experience in this field.

Second, the requirements of space, location and equipment are different for each of the commonly taught sciences, and although the requirements for chemical laboratories are generally considered to be more exacting and more complex than those of any other subject commonly taught in schools or universities, this type of laboratory cannot be handed down—or up—to another science. Three rather well-known points may be cited to illustrate the exacting requirements of chemical work: (1) Chemistry deals with permanent changes in matter, decomposition or destruction and recombination or synthesis of substances. The most active or corrosive substances are especially sought because of the promptness of their reaction. (2) All three states of aggregation—solids, liquids and gases—are produced, or utilized; but gases and vapors are especially common. (3) Energy is involved or absorbed; hence, dissipation, control and supply of heat, over a wide range of temperature, electricity, light, pressure, etc., must be available.

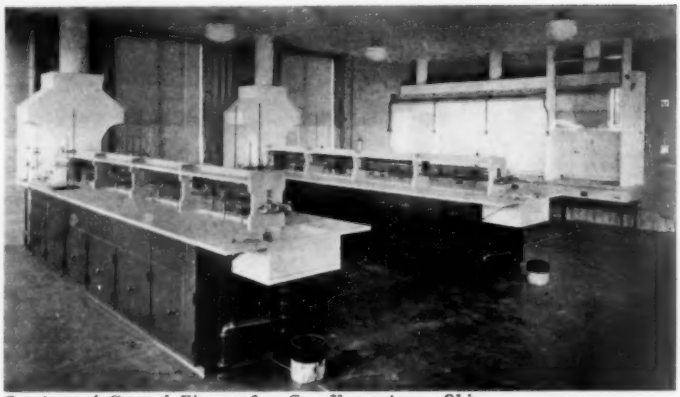
Because of the nature of the products of chemical laboratory work, such laboratories and their equipment should be impervious or resistant to a



COMBINATION CLASSROOM AND LABORATORY

From article by W. W. Knox, Supervisor of Science, New York State Education Department, in *New York State Education*

wide variety of corrosive gases and solutions, dust and powders and high temperatures, and should be not only resistant to, but non-conductors of, heat, electricity, sound, etc. Obvious as these points are, very few builders of laboratories have continued to hold them in mind, if we judge by the results shown in many school and college laboratories. We all realize the limitations of cost and availability of materials which interfere with securing the ideal in laboratory construction; and while it is impossible for any small group of persons to satisfy all others, let us set down a few of the present accepted ideals, as supported by the opinion of a number of builders of recent laboratories, and others interested in laboratory construction.



Courtesy of General Fireproofing Co., Youngstown, Ohio

ORGANIC CHEMISTRY LABORATORY, URSINUS COLLEGE, COLLEGEVILLE, PA., SHOWING STEEL DESKS AND ALBERENE SINKS

In spite of the reported diversities of opinion on the part of architects and scientists, the latter are willing to give the former much liberty, if they will but recognize one fundamentally important principle; that is, in the planning of a laboratory consideration should be given, from the very first, to the work unit that is to characterize the interior arrangement. This unit, in most instructional laboratories, is the student's desk and an adjoining aisle, and averages from the best figures available, 5 to 6 feet long and 4½ to 5 feet wide. Some multiple of these distances, or the unit size agreed upon, should determine the interior dimensions of the laboratory rooms. While combinations of units making the desk or work table 36 feet long are found in some laboratories, units less than 36 feet are generally considered more desirable, since most builders feel that laboratory work should not be carried on at a distance of more than 20 feet from a source of natural light.

A CASEMENT WINDOW

From Report of the National Research Council Committee on Construction and Equipment of Chemical Laboratories

General Arrangement and Materials

It is impossible in an article of this scope to make any appreciable number of suggestions of value regarding the floor plans of college laboratories. In general, laboratory builders may well keep in mind the guiding principle of the planner of modern kitchens—the fewest steps for the most-used facilities—in our case, classrooms and laboratories. In school laboratories, the requirements may be more standardized, and Dr. John A. Clark, Chairman of the Science Council of New York City, recommends a general chemical laboratory of 23 feet x 42 feet, with 13½-foot long connected table units. With regard to service rooms, an excellent description of both arrangement and equipment, by W. B. Foulk, of Princeton, is found in the sixth annual edition of THE AMERICAN SCHOOL AND UNIVERSITY.

As to ceiling heights, the scientist will allow the architect considerable leeway, although he thinks that no ceiling should be less than 11 feet in the clear, and that more than 13 feet is a waste of space. The windows should be arranged to coincide with the widths of working units, so that each aisle between work tables leads to a window. Vertically swung, steel, casement type windows are most popular.

With regard to the construction of walls and ceilings, recently developed materials make possible a break with convention. Ordinary plaster and paint have little place in a laboratory. As indicated by the general principles laid down above, walls and ceilings should be impervious and resistant to corrosive and hot gases and vapors. Glazed tile, or pressed brick for walls, with smooth concrete ceilings covered with cement paints containing no oil, are strongly recommended.

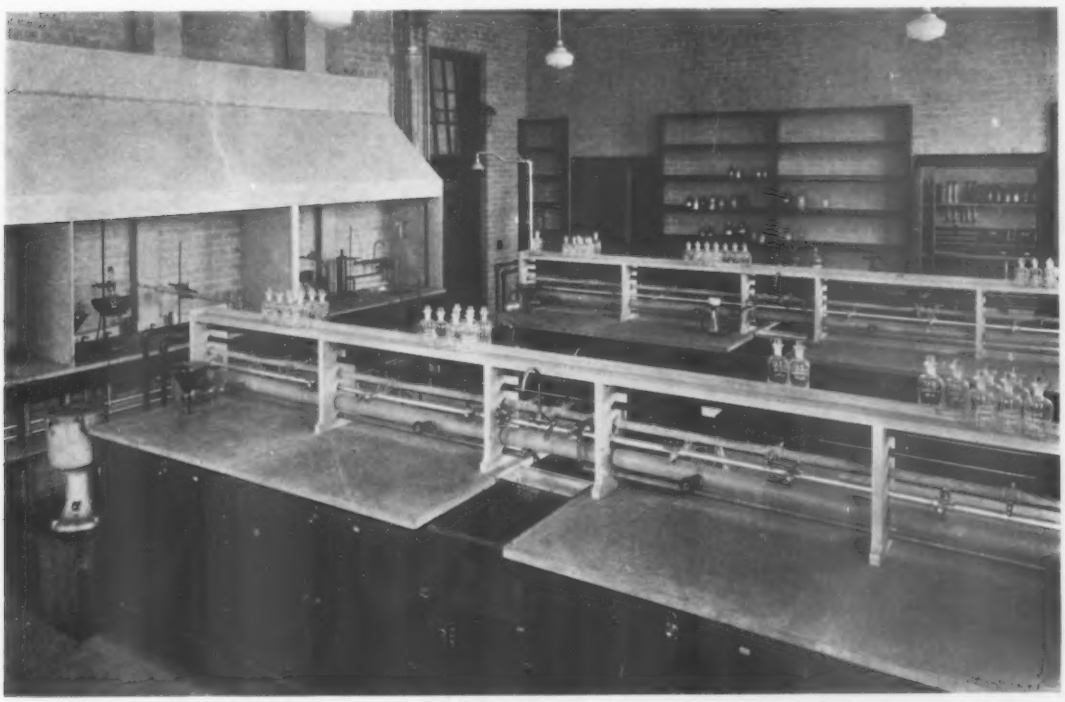
The supporting of desks, hoods, shelves and special apparatus is such an important problem, especially in laboratories for physics and chemistry, that the choice of a wall material may rightly be influenced by this consideration. Certain types of composition building blocks are sufficiently soft to permit drilling for expansion bolts. Brick walls can generally be treated in the same way, but more difficulty is experienced with hollow tile or plaster walls. A simple but effective "T" slot, built into the wall, has been devised by H. S. Coleman, Assistant Director of The Mellon Institute of Industrial Research, which is superior to the built-in wooden strips sometimes installed. One consideration with respect to the wall and ceiling materials, especially of classrooms, frequently escapes the notice of the laboratory builder. This is sound absorption. In rooms for laboratory work, this factor is of somewhat less importance, but in other school and college rooms where plaster or tile is used, special wall and ceiling treatment should be carefully considered.

Floors should be especially resistant to penetration by gases and liquids, and should be continuous, slightly elastic sheets of resistant material—the best example of which is the class of substances known as mastics.

The laboratory should be fitted with a minimum of trim and projections such as baseboards and panels likely to collect dust. As in the case of work tables, steel trim, and even steel doors, have become strong competitors for wood. There is no need for ornamental baseboards, but a smooth cove finish, with the impervious floor covering material carried up on the wall, is strongly approved. Work tables and lockers should be raised in some fashion from the floor level, and the whole laboratory should be equipped with floor drains so that, if necessary, it can be entirely wet down with water and flushed out without damaging the exposed equipment. This is a requirement which is best met by steel equipment, and a semi-permanent desk base covered with a continuation of the floor surfacing material.

Laboratory Tables

The work tables or desks for student or research use should be covered with an extremely resistant material; and although strong individual preferences are frequently met, the hard variety of soapstone, known as Alberene, meets with the most widespread approval. The height of this work table, based upon average measurements, as well as opinions, is 37 inches for adults, and 36 inches for elementary students. Definite agreement on the material to be used in the construction of laboratory work tables cannot be recorded at this time. There is a pronounced shift from wood to steel in many recent laboratories. When properly protected in inaccessible as well as exposed places, steel furniture offers unexcelled advantages for many uses. For general laboratories, the opinion of most builders is still apparently fixed upon giving equal favor to wood and steel. Pursuing further the fundamental idea of a standard size desk unit, many builders arrange to have the interior fittings of the different work units inter-



VIEW OF A CHEMICAL LABORATORY, SHOWING BRICK WALLS, OPEN HOODS, PLUMBING OUTLETS, STONEWARE SINKS, AND WOODEN DESKS

Courtesy of Gleason-Tiebout Glass Co.

CELESTIALITE (DAYLIGHT IMITATION) LIGHTING FIXTURES IN CHEMICAL LABORATORY, COLLEGE OF THE CITY OF NEW YORK

changeable and easily removed from the desk top and supports.

Plumbing

The fundamental governing principles regarding the complicated supply lines and waste piping necessary in a laboratory have been pointed out by numerous writers. These fundamentals are accessibility and flexibility. The preferred location for mains is vertical pipe wells, or corridor wall chases with removable panels; and for horizontal distributing lines, where possible, the ceiling below the floor to be served; otherwise, accessible floor trenches. To the principles mentioned above, one should add adequate capacity. The diameter of conduits, as well as the diameter of all pipe lines, can well be larger than the accepted specifications. In the case of conduits, it is thus possible to withdraw wires and connect new sources of current without difficulty. If possible, red brass, or copper, should be used for all water pipes, whether hot or cold, except for distilled water, for which purpose block tin remains the one acceptable material. Since financial considerations frequently govern the choice of the material for cold-water supply lines, generous-sized wrought iron is the most commonly used material. If well over-size, a number of years' deposit of scale can be accommodated without serious decrease in flow. For all other supply lines, not mentioned, wrought iron pipe is preferred. This includes hydrogen sulfide, if thoroughly dry gas is supplied from gas holders.

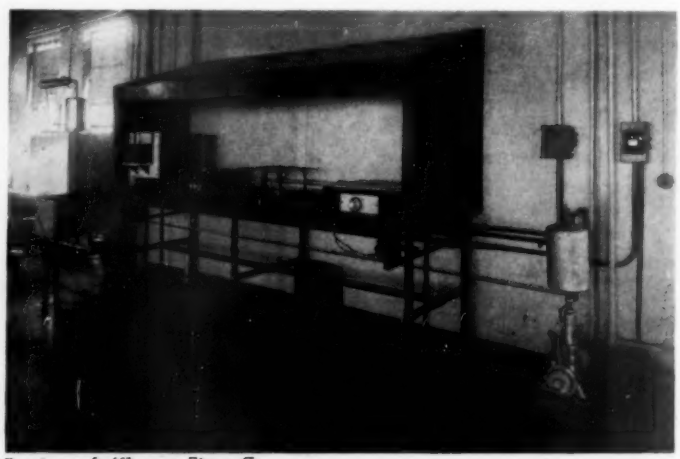
For drain lines and piping for liquid wastes, chemical stoneware, carefully joined, is the most favored, with silicon iron, or combinations of cast iron with silicon iron traps, second. Builders in general and the Research Council Committee are almost equally divided on the choice of the material for laboratory sinks between Alberene and chemical stoneware, a slight majority favoring the latter. For desk troughs Alberene is almost unanimously favored.

Desk outlets are placed, by the majority of chemists, on exposed piping under a reagent shelf, at the center of a double work table. Hose-connection outlet-cocks, of simple lever-handle stop-cock type composed of smooth-finish bronze, are preferred. Chromium-plated fixtures have not been found satisfactory in chemical laboratories, but stainless-steel reducing valves, even on hydrogen sulfide lines, give promise that this material may be more generally available for laboratory fixtures and utensils.

Lighting

For the natural lighting of laboratories, where possible, one-half of the outside walls, above worktable height, should be window space. North or even south exposure is preferred to the more variable east or west exposure; for afternoon laboratory sections, however, rooms lighted from the east are more acceptable than those lighted from the west. For certain types of instrument and microscopic work, especially in biology and physics, window-sash with cross bars and small panes of glass are objectionable. Vertical lighting has not been so popular in laboratories as in industry.

Artificial lighting practice in laboratories is in agreement with the results of numerous studies of school lighting. From ten to fifteen effective foot-candles, on the working surface, is the intensity of illumination recommended at the present time for ordinary laboratory work. Enclosed bulbs, with some modification of the light to approach a diffused daylight spectrum, is recommended. Most builders are using relatively large unit fixtures well above, but over, laboratory tables. Semi-indirect or indirect lighting is preferred for classrooms.



Courtesy of Alberene Stone Co.

OPEN-TYPE FUME HOOD IN THE CHEMICAL DEPARTMENT OF THE NAZARETH CEMENT CO.

Ventilation

The most exacting problem of chemical laboratory construction is that of ventilation. For the removal of objectionable fumes, relatively small individual down-draft hoods, properly designed, are preferred by a slight majority of chemists for elementary classes. For advanced work, side-wall hoods enclosing the apparatus in use are preferred. An arrangement of full-sized open hoods on the wall ends of laboratory tables has been found to be satisfactory for elementary classes in some laboratories. The open type of hood with properly proportioned baffles, or slots, both at the top and at the bottom, is now most commonly used. The design and proportioning of air withdrawals from such hoods calls for special consideration too detailed to be covered here. Not less than 30 linear feet per minute of air movement should be provided over the whole of the front of open type hoods, and from 50 to 60 feet is recommended for special-purpose equipment. With open hoods, direct natural ventilation from open windows cannot be employed, although baffled window openings and air diffusion around certain casement type windows does not interfere.

Air removal from chemical hoods is most effectively brought about by relatively small individual fans for each working unit, room or hood; the suction of such fans should be greater than that of the general ventilation equipment, and cross, or combination connections of different rooms or floors is in general to be avoided. Ducts and fans should be of corrosion-resistant materials, or adequately treated with protective coatings more resistant than ordinary metal paints. Even though located at a distance from the hood or room being ventilated, quiet operation of fans is essential to comfort.

Conclusion

In this brief summary, some important principles and many interesting details have remained untouched. However, one final suggestion is made which, if fully appreciated, is of more value than specific details. This suggestion is that the successful planning and equipping of a science laboratory is a major problem in research and administration. The teacher and the architect need ample time for individual and cooperative study, experimentation and consultation. Changes, mistakes and corrections should be made in tracing cloth and blueprint, rather than in brick and mortar.

127,000 SCHOOL DISTRICTS ARE TOO MANY

With 127,000 school districts in the United States and 423,000 school board members to manage them—more board members than pupils in some districts—the movement toward consolidation should be supported, says W. S. Deffenbaugh, Chief of the Division of the American School System, U. S. Office of Education.

One-teacher schools, with enrolments of fewer than a dozen pupils apiece, are common in many of the states, Mr. Deffenbaugh comments in the June, 1934, issue of "State Government," official journal of the American Legislators' Association. Many of these schools serve Lilliputian school districts. In seven states, the average area of the districts is nine square miles or less.

The small school district, he says, is generally inefficient because: (1) it cannot provide a suitable modern educational program; (2) opportunity for the children is unequal, owing to the inequality in wealth among the districts; (3) if it is unable to support a high school, tuition for the children must be paid to districts that do maintain high schools; (4) there is a lack of educational leadership, and, as a result, schools in the small districts often make little or no advancement.

"No one can say definitely just what type of school unit is best for administrative purposes," Mr. Deffenbaugh says. "What may be a workable system in one state would prove a failure in another." North Carolina and Virginia have made the county the school unit. Florida, Louisiana, Maryland and West Virginia include cities in their county school units. New York has found successful the community school district, comprising the village or small city and surrounding country within a radius of several miles.

Progress in eliminating the small school district will continue to be slow, Mr. Deffenbaugh concludes, until the people and their legislative representatives realize that social and economic conditions have radically altered the problems of educational administration. They will have to recognize that the systems which once worked well are not necessarily good for the needs of the present and the future, and that efficient school systems can be achieved only with wise planning.

Physics Classrooms and Laboratories in the Wichita High Schools

BY J. W. E. STOGSDILL

INSTRUCTOR IN PHYSICS, WICHITA HIGH SCHOOL EAST, WICHITA, KANS.

IT IS not often that a group of high school science teachers are able to incorporate their desires in the design of their new classrooms and laboratories. This unusual happening has taken place twice in Wichita. In 1923 Wichita High School East was built, with everything in connection with the science department designed by the teachers concerned. In 1929 Wichita High School North was built, and the same process was repeated. This article describes the physics classrooms and laboratories, particularly those at High School East.

After the general design and the dimensions of the building had been accepted by the Board of Education and Superintendent L. W. Mayberry, it was agreed that any suggestions that the science instructors cared to offer should be submitted to the architect. B. W. Truesdell, Vice-Principal and Head of the Science Department, together with John M. Michener, James A. Glover, and the author, proceeded to make out drawings for the entire science department. They were first given the dimensions of the floor space allotted to the science department. The space took up about one-fifth of the classroom space in the building. It was decided to use the south side of the building on the second and third floors. Physics and chemistry were located on the third floor.

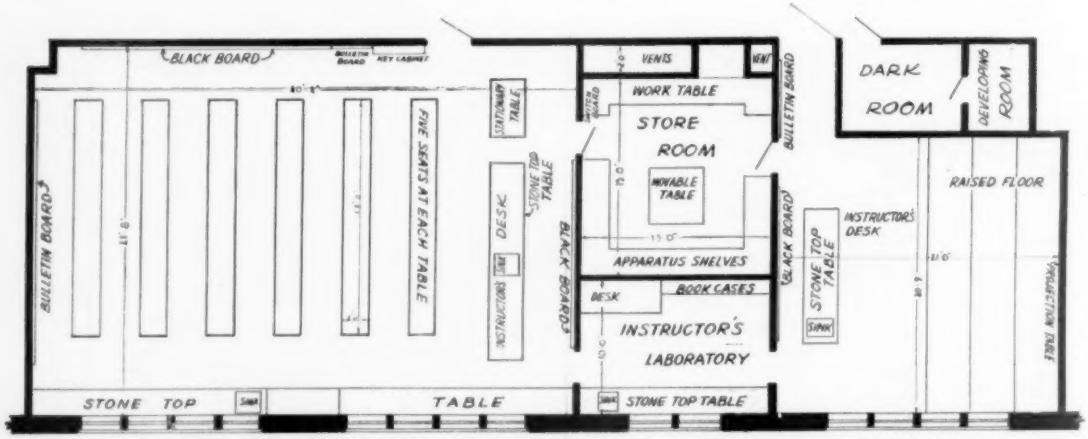
These men had worked together for several years. They agreed that nothing would be incorporated in their plans unless it could stand up under the criticism of all. They proceeded to divide up the space into the respective rooms so as to give the most equitable divisions possible. After determining the size of the rooms, they began to work out the separate rooms. Although this deals only with the physics rooms, the same careful work was carried out throughout all the science rooms.

The Classroom

It was decided that the physics classroom and the laboratory should be designed to accommodate thirty pupils each at a time and that the classroom should have four rows of raised seats and one row placed on the floor. The seats used throughout the school are movable desk chairs. The instructor's table is 2½ feet wide by 10 feet long and 3 feet high. It is equipped with an open knee-space in the middle, and drawers on either side. Some of the drawers are filing drawers for tests, etc. A lamp-bank is mounted on the back side under the sink. The table is equipped with gas, compressed air, hot and cold water, distilled water, 220 three-phase, 110 a-c, 6-12 d-c, 110 d-c, and two other electrical outlets; one may either be 110 a-c straight, or through the lamp-bank; and the other outlet, 110 d-c straight or through the lamp-bank. A specially built switch on the lamp-bank board can be thrown so as to use the lamp-bank on either the a-c or d-c circuits. At the rear of the classroom is a small cupboard containing a folding table, similar to an ironing board, for use with projection machines. Near this board is one of the two three-way light switch controls of the room lights.

The Storeroom

The storeroom wall is lined with drawers and cupboards. The drawers occupy the space up to about 34 inches above the floor, and shelves



TYPICAL PHYSICS CLASSROOM AND LABORATORY IN THE WICHITA HIGH SCHOOLS

with glass doors rise about 6 feet higher. The rest of the space to the ceiling is filled with shelves with wood panel doors, used for storage. In the center of the storeroom is a large movable table, which is called an apparatus or assembly table. Across the north side of the room is a work-bench and repair table, below which are drawers with tools used for general work of all kinds. Above the work-bench are outlets for 220 three-phase, 110 a-c, 6-12 d-c, 110 d-c and gas. These outlets are very handy in checking any piece of electrical apparatus and for making connections for optical benches, etc. Also, on the east end of the work-bench is a cabinet containing several rows of small drawers used for nails, screws, rivets, washers, chains, etc.

Instructor's Laboratory—Dark-Rooms

The instructor's laboratory and office is equipped with an alberene stone top table along the outer wall, with water and electrical outlets. This is handy for setting up special apparatus for experimental purposes, which can be left alone without any danger of being tampered with by the pupils. Below the stone top are eight filing drawers on one side of the radiator and several different-sized drawers on the other side. Besides these, there are bookshelves, two desks, a tall filing cabinet, and a special case with a cylinder lock for valuable instruments.

The dark-rooms are used in general photographic work, the making of slides, the making of enlargements, and somewhat for dark-room experiments in the study of light.

The Physics Laboratory

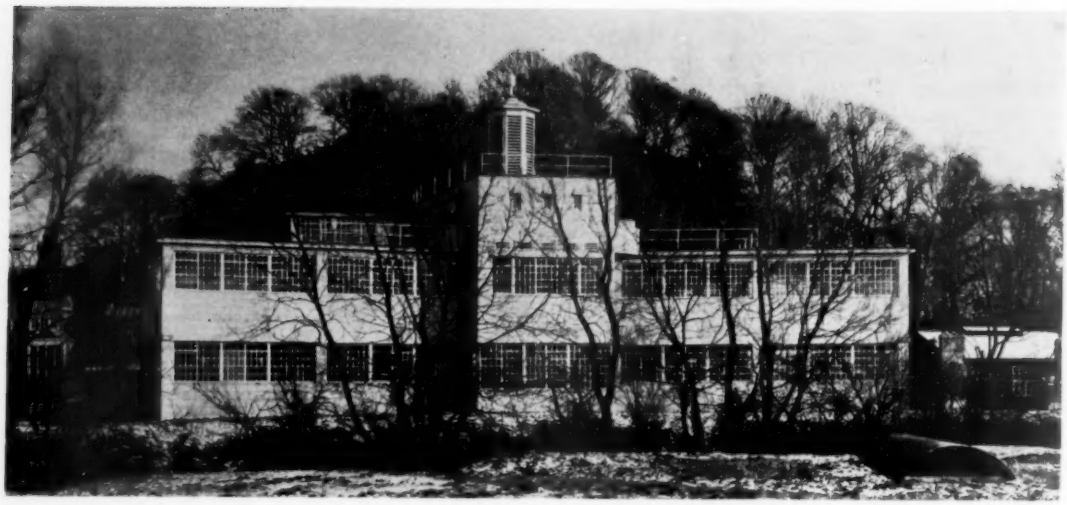
In arranging the laboratory it was decided that all students should face in one direction. In order to do this and still prepare for thirty pupils, it was necessary to have six tables with five places at each table. The desks are 2 feet wide and 18 feet long, thereby allowing 3.6 linear feet to each pupil. The desks are 3 feet apart and 3 feet high. Each pupil's division has across the top, just below the table top, the following: 110 a-c, 6-12 d-c, 110 d-c, gas and a common drawer. The space below is divided into two rows of five drawers each, and a knee-space. An adjustable swivel stool is attached, so that the pupil may either sit down and write or stand up to perform his experiments as he may desire. With the ten drawers it is possible to have ten different students use the same desk over a period of two days' time. Between each two drawers there is a separator so that one student cannot get into the drawer below. The drawers are numbered systematically and the keys are kept in a key cabinet. Each period has a separate key cabinet. Each desk, as well as all the other tables, is equipped with toe-spaces.

The instructor's long table is arranged similar to the table in the classroom, with all the outlets except the lamp-bank connections. The end of the table near the outside (south) wall is filled with small drawers, with three divisions in each for keeping such items as vernier calipers, lead sinkers, specific gravity bottles, weights and other small articles used in different experiments. Also, the small table next to the inside (north) wall is full of such drawers, in which are stored magnets, small coils for induction, compasses, tuning forks, prisms, lenses, etc., used in light experiments. The large switchboard is located in the wall between the laboratory and the storeroom and is accessible from either side. It is divided into three divisions. The left panel has all the switches controlling the a-c outlets to all pupils' desks, the lecture table and the side table in the laboratory. The center controls all storage battery current throughout the science department. We use two Edison storage batteries, which are interchanged or sometimes may be hooked in series. At the bottom of the center are located the switches for the three-phase circuits. The right panel controls all 110 d-c outlets to the different places in the laboratory. The source of the 110 d-c current comes from a larger motor-generator set which supplies d-c current to several places in the school.

Along the entire length of the outside wall stands an alberene stone top table below which are drawers and cupboards except for the spaces allotted to two small radiators. On the table will be found hot and cold water, distilled water, 220 three-phase, 110 a-c, 6-12 d-c, 110 d-c, gas and compressed air.

The usual comment is, "You have a lot of drawer space, do you use it all?" We have found that every drawer has something useful in it, and the arrangement is indeed satisfactory to all who have worked in the rooms of the Wichita High Schools.

Since the tables involved were not stock tables, they had to be designed in detail and built to order. The general design and equipment proved to be so satisfactory that they were used with very few modifications in the Wichita High School North, which was erected in 1929. The work on the plans was done by the same four men who made the original plans as outlined here.

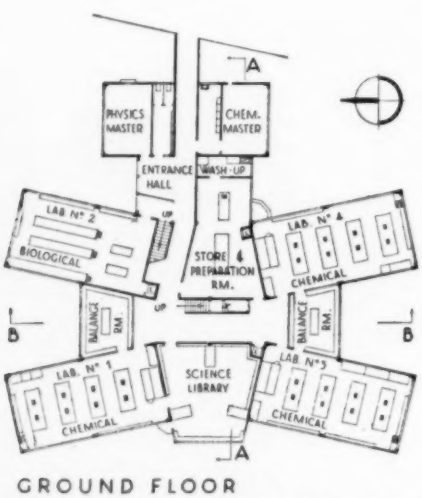


The Science Building of Marlborough College, Wiltshire, England

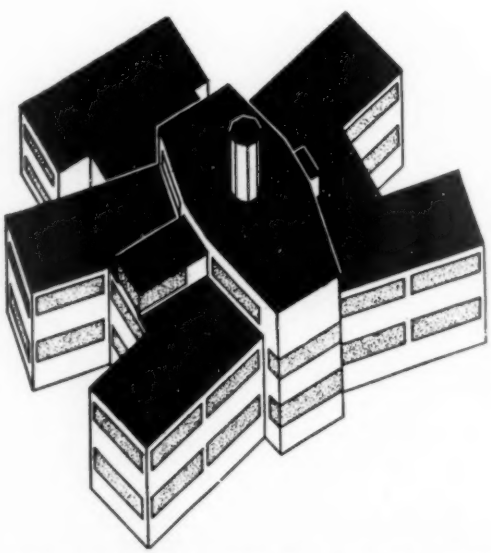
THE site of this interesting building, which provides complete chemistry and biology departments for a public school of 750 boys, at Marlborough College, in Wiltshire, England, is in a flat valley-bottom close to the River Kennet. The ground was waterlogged, and a good bearing could be obtained only at a depth of 11 feet below the surface. The pier foundation, shown in the section drawings, was specially provided to meet the bad site conditions. The hole for each pier was pumped dry, the reinforcement was placed and the concreting of the foundations was completed in one day.

The Plan and the Structure

The building is in five units, separated by expansion joints, comprising the central block with back extension and the four laboratory wings. Strips of wallboard fill the expansion joints. The structure consists of posts supporting beams, which both serve as breast walls to windows and carry from their lower edges the T-beam floors (see isometric drawing on page 347). The ground floor is also carried on beams, there being no load on the surface of the soil.

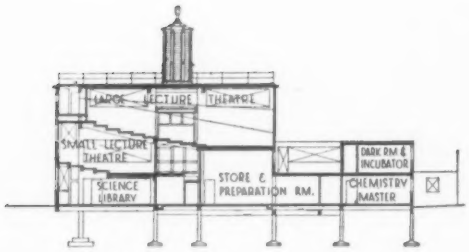


GROUND FLOOR

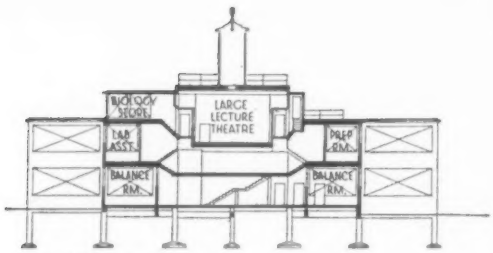


FLOOR PLAN AND AXONOMETRIC DRAWING OF THE BUILDING, WHICH HAS BEEN BUILT IN FIVE UNITS, SEPARATED BY EXPANSION JOINTS

These units comprise the central block with back extension and the four laboratory wings

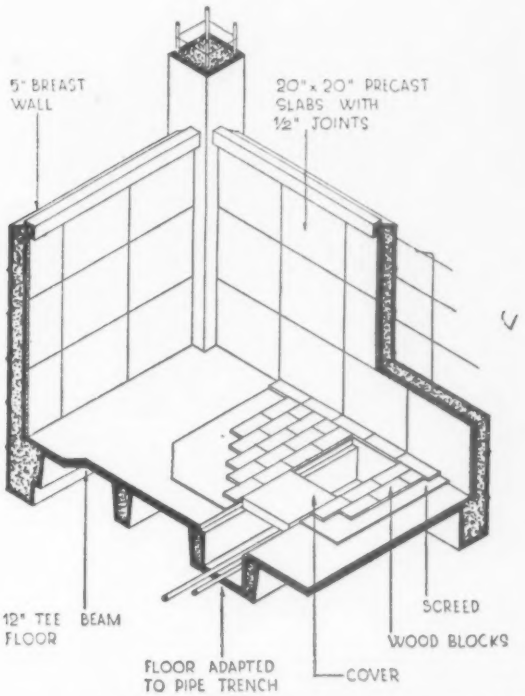


SECTION AA



SECTION BB

SHOWING CENTRAL PLACING OF STORE AND PREPARATION ROOM, FROM WHICH THREE LIFTS TO LABORATORIES ARE ACCESSIBLE



THE BREAST WALLS UNDER THE WINDOWS ARE USED AS BEAMS FOR SUPPORTING THE FLOOR

The plan is set out with pier centers at a spacing of 21 feet 6 inches, the horizontal dimensions of the laboratories being two of these units by one. This was adopted partly in order to permit re-use of formwork. The small lecture theater is arranged under the rake of the large theater (see section 1). The large lecture theater seats 108 and is equipped with a cinema projection room having apertures and space for three projectors. Sections 1 and 2 show the central placing of the store and preparation room, from which the three hand-operated lifts, communicating easily with all the laboratories, are accessible.

The Concrete

The aggregate is an upper Thames valley pit gravel, light in color. The cement was ordinary portland with a small addition of colored cement. No waterproofer was used, for the concrete was carefully graded to make it impervious. The formwork of the vertical faces was struck after three days and the external face brushed with a fiber brush. The panel walls are 5 inches thick, with small V-sectioned projections forming simple external decoration, made by chamfering the edges of shuttering boards. These projections also served to conceal the marks made by successive pourings of concrete.

The internal face consists of pre-cast slabs, 20 inches square, with an aggregate of broken stock brick and portland stone, the surface being subsequently ground with a carborundum-faced mechanical disc. The slabs act as shuttering, held in place by open battening. They are hard and smooth-faced, but porous—hard-wearing, and absorbing surface condensation; nails can be driven into them. They are also to some extent acoustically absorbent.

The Finish and the Equipment

The windows are of steel, painted with aluminum paint and finished with a sprayed green. The glass area in each laboratory is about two-fifths of the floor area. The partitions are of sand-lime bricks flat-pointed, with no internal plaster on walls, ceilings or piers. On the ground floor the floors are of teak blocks; on the first floor, of Granwood blocks. The joinery in doors and fitting is of British Columbian pine, finished with a clear cellulose glaze. The bench tops are of teak.

The heating is by low-pressure hot water and radiators. Pipes and wastes are exposed except where they cross floors, in which a slight rearrangement of the T-beam structure (see constructional isometric) allows wastes to be accommodated in the floor thickness. Externally, the wastes are picked up in lengths of glazed channel along the bases of the laboratory walls.

The ventilation and fume cupboard ducts are in asbestos-cement tubing of rectangular section.

The lantern is of wood, painted green and with a copper roof and gilt finish. It forms the outlet for all ventilation and fume ducts. The roof finish is of asphalt on insulation of 2-inch compressed slabs, which are held down by wire hooks cast in the concrete and bent over the edges of the straw slabs. Gutters are formed in the concrete roof verges, and the asphalt is carried over them.

EDITORIAL NOTE.—For the text from which this article is abstracted, and for the illustrations, THE AMERICAN SCHOOL AND UNIVERSITY is indebted to the *Journal of the Royal Institute of British Architects*, of London.

ABOVE, A TYPICAL CHEMISTRY LABORATORY

The glass area is two-fifths of the floor area. The windows are of steel, side-pivot hung

AT RIGHT, LECTURE HALL, SEATING 108

Equipped with cinema projection room and light-tight blinds. Ceiling of natural concrete, untreated. There is an extract ventilation system; heating by radiators

Shop-Planning Principles*

Formulated by Twenty Industrial Arts Teachers in Conference at Iowa State College in 1933

BY WILLIAM L. HUNTER

HEAD OF INDUSTRIAL ARTS DEPARTMENT, IOWA STATE COLLEGE, AMES, IOWA

1. All parts of the shop should be visible to the teacher.
2. Natural lighting should be at least one-fourth of the floor area of the shop.
3. When possible, have the teacher's desk in the vicinity of the entrance.
4. Block off or fill up recessed spaces.
5. Arrange equipment to permit free use of aisles.
6. When possible, lockers should be inside the shop and recessed in the walls.
7. The floor should be adapted to the type of shop, avoiding concrete when possible.
8. Provide for maintenance of tools and equipment.
9. Place the key cabinet where it is most convenient.
10. Machines commonly used in sequential order should be placed in the order of their operation.
11. Shop doors should open outward.
12. Avoid placing students where exposure might affect their health.
13. Arrange machinery for maximum safety.
14. Utilize to a maximum naturally lighted areas.
15. The blackboard and bulletin board should face the light.
16. Machines should not be placed on columns or pipes which will transmit sound to other rooms.
17. Avoid an open-beam ceiling.
18. Walls and ceiling should be a light color.
19. Equip with self-contained portable machines whenever practicable.
20. Have transparent partitions between the shop and its auxiliary rooms.
21. All of the shop should be on one floor when one instructor is in charge.
22. Do not permit students to regularly use more than one entrance to the shop.
23. Have one large entrance for each shop.
24. Locate toolroom and tool panels so as to avoid excessive travel.
25. Adequate storage space should be provided.
26. The benches and storage equipment should be large enough to accommodate standard sizes of material.
27. Have fire extinguishers of the correct type and size readily available.
28. Keep obstructions out of line of light.
29. Choose north light when possible.
30. Have soundproof floor, ceiling, and foundations to machines.
31. All machines should be controlled by a master switch under lock and key.
32. Grandmaster-key, master-key, and submaster-key all locks to doors of building.
33. Where necessary, have a dust collector for machines.
34. Windows should extend to the ceiling from a point as low in the wall as practicable.
35. Place equipment so as not to interfere with opening of doors.
36. Provide steel cases and waste containers for inflammable materials.
37. Place the most frequently used equipment near the center of operation.
38. Have an adequate first-aid equipment readily accessible.
39. Have metal-covered glue table.
40. Locate machines so as to accommodate maximum-sized material.
41. Ground all power machines and insulate all metal furniture in an electrical shop.
42. Plan the shop so as to reduce disciplinary problems to a minimum.
43. Distribute items of similar equipment so as to be of value to all workers.
44. Paint safety zones around dangerous machines.
45. Equip dangerous machines with effective guards.
46. Provide exits for fumes, gases, and other injurious substances.
47. Do not have large amounts of lumber, supplies, and materials openly accessible to pupils.
48. Have equipment so located as to avoid all shadows possible on working areas.
49. In determining proper lighting facilities, secure the recommendations of a competent lighting engineer.
50. Avoid using the shop as a passageway to other rooms.
51. Floor of shop should not be more than two feet below ground level.
52. When practicable, have all floor space of the same story on the same level.

The group of industrial arts teachers were:

F. E. Angelbeck, Milwaukee, Wis.
L. M. Benson, Madison, Wis.
Leo Brandt, Newton, Kans.
R. W. Breckenridge, Ames, Iowa
L. W. Buising, Central City, Nebr.
F. M. Everhart, Fontanelle, Iowa
P. G. Frasier, Burlington, Iowa
H. P. Gerber, Aberdeen, S. Dak.
H. E. Gregg, Maplewood, Mo.
S. R. Harding, Aberdeen, S. Dak.
C. Hartline, New Martinsville, W. Va.
J. O. Hodgson, Lincoln, Ill.
O. H. Hubbell, Brookings, S. Dak.
W. L. Hunter, Ames, Iowa
D. F. Kittle, Cairo, Ohio
G. E. McAfee, Waukegan, Ill.
W. B. Nelson, Alcorn, Miss.
J. M. Norton, Chatsworth, Ill.
H. S. Palmer, Mason City, Iowa
I. S. Smith, Aberdeen, S. Dak.

* Originally published in the *Industrial Arts and Vocational Education Magazine.*

Planning the Vocational School Plant for Future as Well as Present Needs

Flexibility in Building Design Essential

BY ROBERT O. BEEBE

DIRECTOR, ESSEX COUNTY VOCATIONAL SCHOOLS, ESSEX COUNTY, NEW JERSEY

TO carry on an effective program of industrial education it is essential that the training shall be closely coordinated with the industrial life of the community. It is equally important that the building facilities as well as the methods of instruction and the courses of study shall be so planned and set up that they can be changed with a minimum amount of expense and effort, to provide for new training needs created from time to time by changing conditions and new developments in industry.

Tremendous changes have taken place during the past two decades in our methods of building, manufacturing and merchandizing. These changes have created and will continue to create changes in the character of services required of the workers. The discovery of new materials and processes, the adoption of improved methods, and the introduction of new appliances create a constantly changing demand in the basic knowledge and skills that the workers must possess to man the jobs efficiently.

Any board of education that believes it can build a vocational school, planned from the findings of the most carefully conducted survey, which will function for the best interests of the pupils in a given community for a long time without requiring radical changes, will, I believe, soon discover its error. In some instances the need for changes that could not possibly have been anticipated has developed before the buildings were completed. A vocational school can of course continue to function for the instruction originally planned, but this would not be carrying out its true objective.

Training to Fit New Needs

The problem of the school is to equip boys and girls for efficient participation in adult life. One of the essential requirements for efficient participation must of necessity be some kind of remunerative employment. Only by this means can the individual maintain his self-respect and remain a

AEROPLANE MECHANICS DEPARTMENT, ESSEX COUNTY BOYS VOCATIONAL SCHOOL, BLOOMFIELD, N. J.
Note the double deck tool crib and wash sinks on the right

contented citizen of any community. Therefore, if the vocational school is to function for the best interests of its pupils, its instruction must be of such a character as to equip them to enter the field of employment in the opportunities that exist today or, if possible to anticipate, in those that will be created in the near future.

We must cease to think of a vocational or trade school as a school planned and equipped to teach only basic organized trades, such as carpentry, bricklaying, plumbing, machine shop practice, printing, dressmaking, millinery, etc. On the contrary, it must be prepared at all times to impart the knowledge and develop the skills required by its pupils for entrance into a great variety of occupations, over a wide field of employment in the industrial world. The most extensive and carefully conducted survey cannot anticipate the social, economic and industrial changes that may take place within an incredibly short period of time and may upset almost completely the plans developed from the findings of the survey.

Examples of Changed Demands

Let me give a few concrete examples drawn from the experience of one industrial community, to show the futility of permanent planning for future vocational training needs.

For several years prior to 1918 the great demand for training and the largest opportunity for employment was in the metal trades, in which there was a well-organized apprenticeship system. During the same period it was difficult to interest pupils in training for any of the building trades. With the signing of the Armistice the demand for machinists and machine operators declined rapidly, and this condition was immediately reflected by a lesser demand for training in those trades. In contrast, the unprecedented sudden demand for skilled workers in the building trades forced the vocational schools to undertake an ambitious program of apprentice training for the building trades, for which the school buildings were altogether ill-adapted and inadequate.

Only a few years ago the vocational schools catered to a demand for training in foundry practice, pattern making, house wiring, dressmaking, millinery, etc. But, owing to the social and industrial changes that have taken place, we find a very limited demand for employment in these fields at the present time. Hence a sharp decline has occurred in the demands for training. On the other hand, the schools are called upon today to install departments and set up adequate training facilities in such subjects as radio installation and servicing, aeroplane rigging and repairs, aeroplane engine mechanics, electric and acetylene welding, chain store routine, general factory operations, servicing refrigerating units, as well as oil-burning, coal-burning and air-conditioning equipment, laundry work, luncheonette and counter service, dental assistance, beauty culture, etc. These are only a few of the employment opportunities for which the vocational schools may be called upon to give training. We may feel reasonably sure that as time goes on there will be many more types of employment opportunities, not yet created, for which training will be required.

How are we to anticipate these requirements in planning our vocational schools? It is not my purpose to discuss in much detail the general planning of a vocational school, only so far as the planning and construction involves the question of the adaptability of its facilities for types of instruction other than those for which it was originally intended. Every school should be planned to meet the needs of the particular local community which it will serve, and I do not discount in any degree the value of the intelligently conducted survey as the best means of obtaining the most reliable information with which to create the original set-up.

Those districts which have been through the experience of building a vocational or trade school and studying its progress have no doubt learned much from their experiences. Districts which may be contemplating such a venture may welcome a few practical suggestions gained from such experience.

Practical Suggestions for Planning

Unit Construction.—The unit plan of building seems to be best suited to the development of a school for training in industrial education. It is advisable not only to plan the building so that additional space can be procured by annexed wings, but to plan the rooms and shops on a unit basis so that by the removal or addition of partitions, rooms may be provided from time to time of various sizes to conform to the needs that may arise.

In this connection it is advisable to have as few bearing walls as possible between the rooms and to avoid the placing of standpipes, conduits or ventilators in these separating partitions, so that they can be removed without the inconvenience and expense of changing the layout. It is often found necessary to convert classrooms into shops by removing the separating partitions.

Provide for Future Need.—If there is even a remote chance that the building may be enlarged at some future time, provide space for additional heating units and install pipes of sufficient size to carry the extra load.

It may add something to the initial cost, but it is very desirable to provide extra-large conduits as well as oversize gas, water and waste lines in excess of what would be required for needs that can be anticipated. One outstanding example of a need which could not be foreseen is shown in the recent installation in a newly constructed building of a battery of electric welding machines in a room intended for use in the teaching of painting and decorating. These machines require electrical power up to a capacity of 100 horsepower.

In the layout of conduits and pipes throughout

the building they should be so located as to be accessible for use. Outlets should be generously provided for possible future use, not only in the side walls but in the floors.

Pipe Tunnels and Vertical Shafts.—It is desirable to have pipe lines accessible in case of needed repairs as well as for the purpose of making changes or additional connections. It is therefore recommended that all piping below the basement floor be located in tunnels of generous size large enough to accommodate additional pipes, and that vertical shafts be provided for carrying these lines to the upper stories.

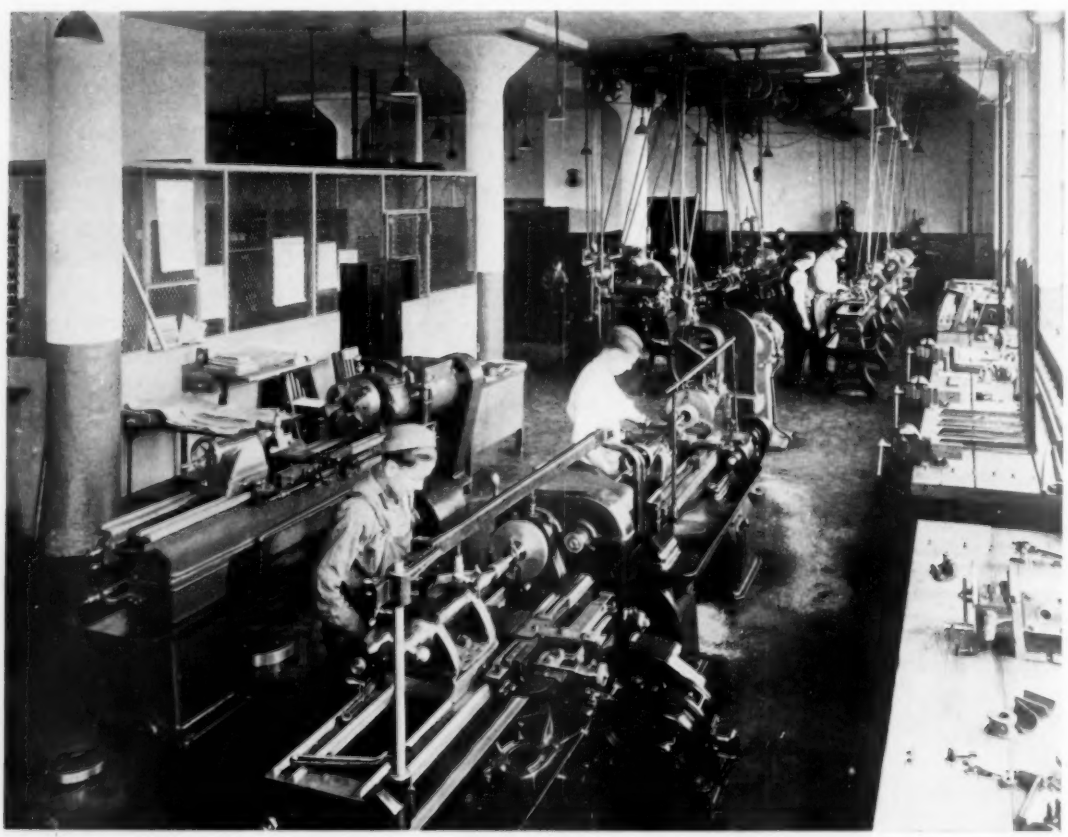
Shops.—It is desirable that the portion of the plant in which the shops are located shall be of factory type construction. The floors should be capable of carrying any load that future needs may require. High ceilings should be provided in all shops, for several reasons. First, some subjects, such as carpentry, require the maximum amount of head room. Second, if the natural light comes from one side of the shop only, the extra height increases the light. Third, with ample head room it is possible to increase the capacity of the shop's floor space by installing two-story tool cribs and overhead storage racks.

Hanger inserts should be provided in the ceilings of all shops when the building is constructed, so that all necessary shafting, motors, storage racks and other equipment may be easily attached.

Size and Arrangement of Shops

It is difficult to set up any rule which can be safely followed in fixing the size of the shops. Some activities require more space than others. The most advisable plan is to provide large, open shop space so planned that partitions can be placed between supporting columns. Experience seems to indicate that 35 feet is about the most desirable width for shops. Open shops 70 feet wide with a row of columns through the center can be apportioned into shops very conveniently. By placing a partition lengthwise through the center and providing two shops 35 feet wide, it is possible to create ideal shop spaces.

This arrangement of shops side by side is not only flexible but economical. First, it provides window space on one side where the work-benches are usually located, and wall space on the other side where the tool crib, supply racks, wash sinks and pupils' lockers may be placed. Second, the



MACHINE DEPARTMENT IN THE ESSEX COUNTY BOYS VOCATIONAL SCHOOL IN IRVINGTON, N. J.
The pupils' lockers are located in the shop. Half of the room is provided with line-shaft and the other with individual motor-driven machines

tool cribs for the two shops can be placed back to back with a connecting doorway in the partition. This will be found convenient and economical especially in handling evening school classes, when one tool boy can serve the pupils in two shops. Third, the plumbing connections for the wash sinks are grouped together in one unit in a convenient location.

SODA FOUNTAIN AND LUNCHEONETTE SERVICE DEPARTMENT IN THE ESSEX COUNTY GIRLS VOCATIONAL SCHOOL IN NEWARK

This department is located in a basement room formerly used as a storage room

The General Equipment

It is essential that a well-planned and up-to-date school for instruction in industrial education should be as complete as a school designed for instruction in any other type of education. There should be a gymnasium and an auditorium, not a combination of both. These have never proved satisfactory and are no more suited to the needs of an industrial school than a school of any other type. It should have a cafeteria, a shower room and a locker room equipped with lockers for physical training work. I strongly advise, however, against the central wash room and locker room. In the first place, it is difficult to provide these rooms of sufficient size to accommodate the pupils of the entire school, and more difficult to provide for possible necessary expansion. In the second place, the whole problem of pupil and property control is much more easily and efficiently handled by dividing the responsibility among the instructors. This is easily accomplished by placing the wash sinks and lockers in the shops and thereby eliminating the necessity for a great amount of passing of pupils about the building.

GENERAL VOCATIONAL DEPARTMENT IN THE ESSEX COUNTY BOYS VOCATIONAL SCHOOL IN NEWARK

This room was formerly used by a department that required no power

These are only a few of the things that have proved by experience to be of great importance in planning a suitable building for carrying on industrial education. We must keep in mind the fact that nearly all school plants are financed with the proceeds derived from the sale of bonds. These bonds will be paid for not only by the pupils who attend the schools at the time they are built, but by those who will use the buildings for many years to come. The schools should be planned as far as possible so that they can be adapted to the changing needs of all the pupils who will use them and who will be required to help pay for them. Therefore, in planning each detail of our vocational school plants let us keep constantly in mind the importance of flexibility.

American Type Founders Sales Corporation

DEPARTMENT OF EDUCATION

Elizabeth, New Jersey

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Everything for the school print shop—cabinets, presses and general supplies for both pressroom and composing room.

The Department of Education of the American Type Founders employs the services of professional educators, efficiency engineers and trained salesmen to aid you in the organization of printing courses in your school.

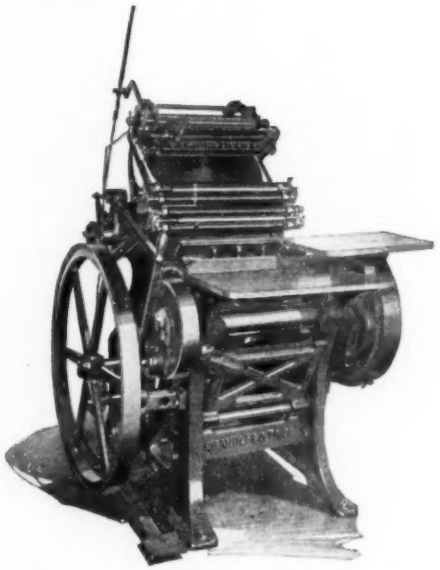
The American Perfection School Type Cabinet

This up-to-date cabinet of steel construction in olive green finish, with working bank top sloping both ways and handy lead and slug rack under both edges of the top, provides normal accommodations for four pupils at a time in typesetting. Two pupils working at each side have between them a complete equipment of type, spacing materials and galley dump. There is no superstructure on this cabinet to obscure the instructor's view of his students.

The American Ideal School Type Cabinet

This cabinet has been especially designed for use in the Junior High Schools. The double working bank top accommodates two pupils at a time in setting type. The cabinet contains one No. 2701 Blank Case, thirteen No. 2735 California Job Cases and two No. 2765 Wells Two-font Cases—all cases full size. Where desirable, this cabinet may be ordered without overhead lead and slug rack, and with lead and slug case.

We recommend these two styles of cabinet for schools desiring the best quality combined with compactness and efficiency of operation.

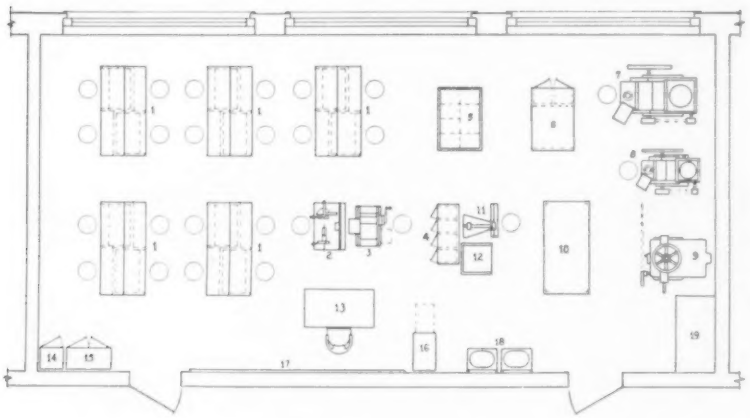


Chandler & Price New Series Printing Press with attachments

No. 870 American School Type Cabinet, the choice of many Senior High Schools

No. 9190 American Ideal Type Cabinet, the wise selection for many Junior High Schools

AMERICAN TYPE FOUNDERS SALES CORPORATION



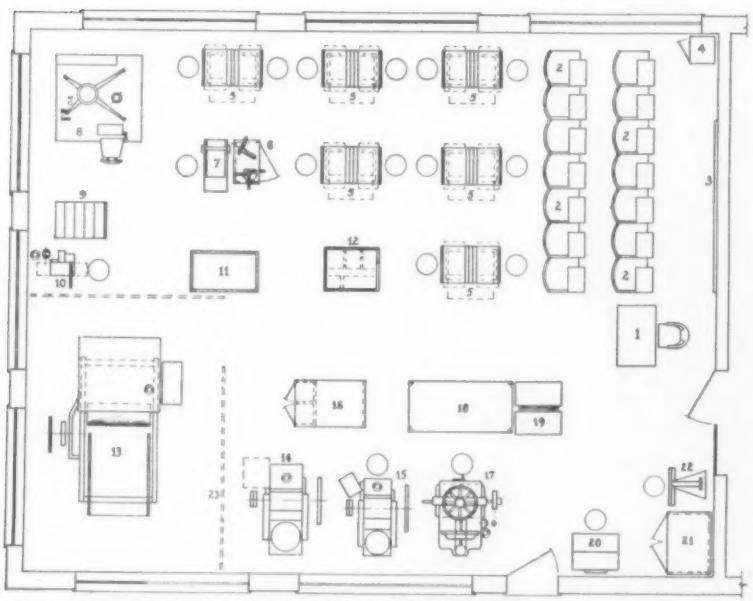
KEY TO FLOOR PLAN

1 No. 870 American School Type Cabinet
2 No. 528 Cut-Cost Work Bench
3 No. 1 Vandercook Proof Press
4 No. 13535 Galley Cabinet
5 No. 13982 Imposing Table
6 No. 529 Platen Pressroom Cabinet
7 12x18 C. & P. Platen Press
8 8x12 C. & P. Platen Press
9 30½ in. Lever Paper Cutter
10 No. 15038 Bindery Table
11 No. 5 Boston Wire Stitcher
12 No. 789 Stock Forwarding Table
13 Instructor's Desk
14 Instructor's Wardrobe
15 Book Case
16 Filing Cabinet
17 Blackboard
18 Lavatory
19 Stock Cabinet
Power Outlet
Position of Student

Above—An admirably planned layout for a print shop in a High School

These two layouts typify the careful, painstaking attention given by our Educational Engineering Experts to the special requirements of individual schools. We are glad to collaborate with your school architect to present a layout especially prepared to your specifications.

Below—A fifteen-pupil layout designed for the special requirements of a Junior-Senior High School



KEY TO FLOOR PLAN

1 Instructor's Desk
2 Classroom Chairs
3 Blackboard
4 Instructor's Wardrobe
5 No. 9190 American Ideal School Type Cabinets
6 No. 13646 Work Bench and Storage Cabinet
7 No. 01 Vandercook Proof Press
8 Model 8 Linotype
9 No. 13520 Dbl. Col. Galley Cabinet with No. 12146 Dump Top
0 Model "A" Cost-Cutter Saw
11 No. 4080 Imposing Table
12 No. 3978 Imposing Table
13 Cylinder Press
14 12x18 C. & P. Press with Rice Feeder
15 10x15 C. & P. Press
16 No. 9095 American School Pressroom Cabinet
17 30½ in. Diamond Power Paper Cutter
18 No. 15038 Bindery Table
19 20 in. Foot Power Perforator
20 Rosco Punch
21 Paper Storage Cabinet
22 No. 3 Boston Wire Stitcher
23 Guard Rail Location if it is required

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***Glass* Electrode**

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***Quick* Accurate Weighings**

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THE AMERICAN SCHOOL AND UNIVERSITY

BAUSCH & LOMB OPTICAL COMPANY

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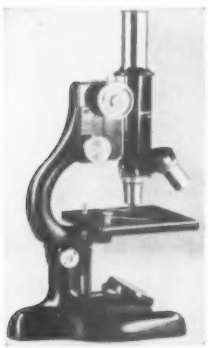
F MICROSCOPE

The Bausch & Lomb New Low Cost Microscope—the F—was designed for high schools with reduced budgets. It is accurate, sturdy and surprisingly smooth in adjustment and operation.

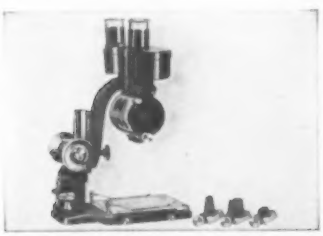
The equipment is standard, including a divisible objective on all models, which gives two powers in a single objective. The fine adjustment, not always necessary in high school work, has been eliminated in the interests of economy. Magnification ranges are from 20 to 300 diameters.

THE F B MICROSCOPE—a development of the former F S Model, the choice of American Schools which has stood the test of years and needs no introduction to science instructors. Every detail of design and construction of the F B carries with it the expert craftsmanship that only Bausch & Lomb can impart. All parts are standard and the instrument is equipped with rotatable disc diaphragm, fine adjustment and revolving dustproof nosepiece. (Cannot be equipped with substage condenser.)



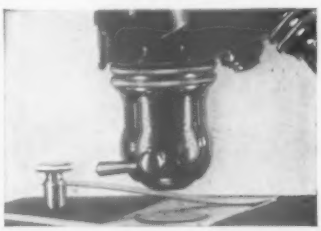
A K W MICROSCOPE

The A K W Wide Field Microscope has these advantages: Stereoscopic vision enabling a three dimensional view. Five interchangeable and parfocal objectives which give a range of from 7X to 150X. Long working distance for dissection. An image which is neither inverted nor reversed. An extremely wide field. It is one of the most valuable "all around" microscopes ever designed.



BIFOCUS OBJECTIVE

The Bifocus Objective makes a convenient addition for the microscope. Simply by turning the lever you can convert the objective power from 10X to 4X for low magnification purposes. It was designed especially for use on the new "F" microscope to make it easy for elementary students to change objective powers.



MICROSCOPE TABLE LAMP

This Table Lamp can be used to illuminate several microscopes at once. It is invaluable in class room work where groups of students are making observations at the same time.

B & L MICROTOMES

The B & L complete line of microtomes makes available a microtome for every sectioning purpose. Literature on these instruments is available on request.

OTHER BAUSCH & LOMB INSTRUMENTS

The instruments listed herewith are but a small part of the complete line of B & L products for the Educational field. If you have need for advice or information on any optical products whatsoever, Bausch & Lomb will welcome the opportunity to be of service to you.

THE AMERICAN SCHOOL AND UNIVERSITY

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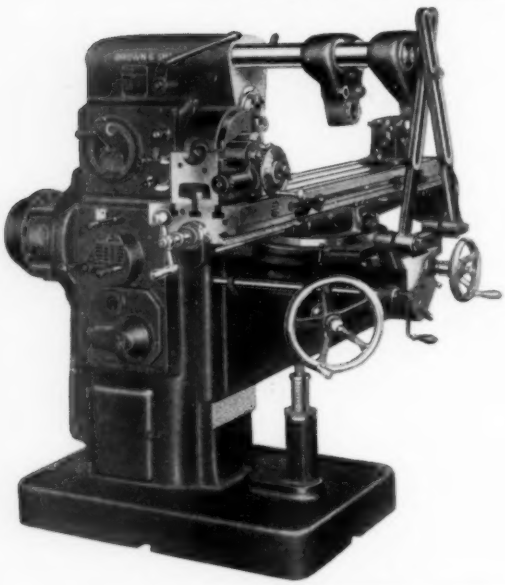
BROWN & SHARPE MACHINE TOOLS



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Investigate the No. 2 Light Type Universal Milling Machine (shown here)—an ideal machine for the school shop.

—convenient height
—easily operated
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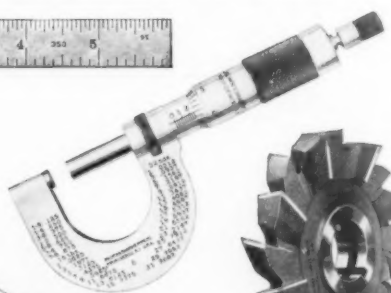
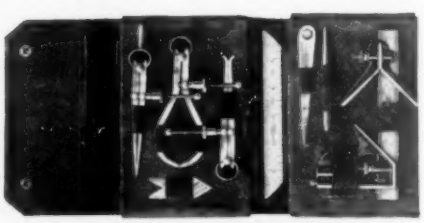


MILLING CUTTERS
END MILLS
FACE MILLS
SLITTING SAWS
GEAR CUTTERS and
HOBS



MISCELLANEOUS SHOP EQUIPMENT

Ask about Sets of Tools for Students Nos. 847, 848 and 849—desirable selections every shop student should own

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FRED S. CARVER

Hydraulic Engineering and Equipment

345 Hudson St., New York

THE CARVER LABORATORY PRESS

A small but powerful, hand-operated hydraulic press, thoroughly developed and standardized. This press has many applications in the college or school chemical or physics laboratory. It is a most convenient tool for studies, demonstrations and research. Hundreds are in use by the larger commercial institutions in their research departments—and by nearly all the government departments.

The press itself is entirely self-contained, designed to set on any laboratory bench or table. Standardized, interchangeable accessories multiply its uses providing for the solution of nearly all pressing problems.

The Carver Laboratory Press is furnished alone for general use; or with any of various accessories for specific use; or completely equipped for general research and study.

Some of the Many Users

The Carver Laboratory Press is generally accepted as standard laboratory equipment.

About eighty-six colleges now have them, many having several in different departments, among them being the following:

University of Arizona	2
University of Cincinnati	2
Harvard University	2
Leland Stanford University	2
University of California	3
Columbia University	3
University of Maryland	3
Michigan State College	3
University of Michigan	3
University of Washington	3
University of Illinois	4
Iowa State College	4
University of Texas	4
Mellon Institute	8
Cornell University	7

Write for catalog which gives full details about the press and its applications.

Load 0 to 20,000 pounds, platens 6″ square, opening adjustable 0 to 16″ (7½″ between columns), stroke 6½″, length 16½″, width 15½″, height 36″, weight 125 lbs.

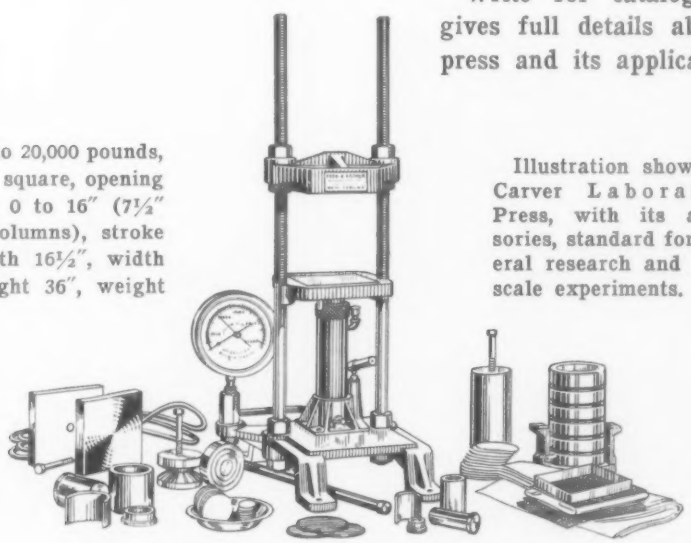

Illustration shows the Carver Laboratory Press, with its accessories, standard for general research and small scale experiments.

CHEMICOLLOID LABORATORIES, INC.

Manufacturers and Distributors

44 Whitehall St., New York

CHARLOTTE COLLOID MILL PORTABLE LABORATORY MODEL

For School and College Laboratory Use

Many school and college laboratories have frequent use for a high-speed emulsifier and disintegrator, in which liquids, solids in liquids, and pastes, can be finely dispersed, disintegrated and homogenized.

The **Charlotte Colloid Mill** is well known in the process industries for its efficiency in producing all types of emulsions; suspensions; the thorough blending of ingredients to bring out and incorporate color or flavor; the improvement of texture; the disintegration and dispersion of solids in liquid media, and the grinding and extraction of fibrous materials. It is widely and successfully used in the following industries: food products, cosmetics, pharmaceutics, paint and pigments, polishes, asphalt and tar, rayon, rubber, carbon paper, paper, dyestuffs, ink, flooring and textile industries.

The ability of the **Charlotte Colloid Mill** to produce an absolutely standard, uniform product, which is superior due to the thorough blending of all ingredients; its consequent saving in the amount of material necessary to obtain a desired color or taste; its adaptability for emulsions, disintegrations, or suspensions; has been by now thoroughly demonstrated.

The New Charlotte Portable Laboratory Model is particularly well adapted for educational development and laboratory experimental work in schools, as well as for plant and laboratory research, etc., in the process industries. Incorporated in it are all of the features to be found in the larger sizes of the **Charlotte Colloid Mill** with the additional advantage of easy portability.

Being a self-contained unit with the motor and mill all mounted on one base, it does not therefore require a special base. It will operate on a table or stand, and can be readily moved from one department to another, or it may be mounted on a platform truck when operations require bringing it to the various feed or supply tanks.

How it works: The materials to be dispersed, disintegrated, emulsified or homogenized are brought to the inlet of the mill by gravity. From this inlet, the speeding rotor by its action forces the product through the gap between the rotor and stator, thence through the outlet of the mill. The mill is easily cleaned and readily dismantled for inspection.

Specifications: Weight, 200 lbs. net
Speed, 3600 r.p.m.
Adjustment, external
Motor size, 1 hp.
Capacity, 1 to 10 g.p.h.
Inlet, ¾"
Outlet, ½"
Rotor and Stator, 2" x 2½"
Power required (water), ½ hp.
Floor space, 14½" x 34"

Construction: Monel metal material chamber, inlet, outlet and feed funnel; i.e., all parts coming in contact with material are of Monel metal.

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THE EATON-DIKEMAN COMPANY

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Twenty grades of our papers are made under the careful supervision of laboratory experts, who thoroughly test all raw material, chemicals and water before using. An analysis of the spring water used in making our Filter Papers showed it to be nearly as pure as distilled water. This fact assures you that the E&D Filter Papers are free from chemicals and salts that would be injurious to the filtered product.

Ask for the E&D Label

E&D Filter Papers are sold by all laboratory supply houses, under their label or the E&D label. Upon your request to them, they will supply you with our paper under the E&D label; **then you will be sure that you are getting E&D quality.**

We supply our Industrial Paper in rolls, sheets and circles, the sheets and circles being punched with standard size holes in any position, for filter machines or presses.

In the Oil, Varnish, Paint, Mining and other industries, it has been found that the use of E&D Filter Paper in conjunction with filter cloths has often greatly improved their product and solved many problems.

E&D Qualitative and Industrial Filter Papers are also used by bottlers, brewers, sugar refiners, perfumeries, distillers, and manufacturers of edible and vegetable oils and other food products, where purity and high quality are desired.

For School Laboratory Use, We Recommend:

No. 613—white, smooth, retentive
No. 615—white, creped, rapid
No. 617—white, heavy, creped
No. 619—gray, creped, rapid
No. 629—white, heavy, retentive.

(Packed 100 circles in cartons up to 20 cms.)

Tell Us Your Requirements and We Shall Be Glad to Submit Samples

EDISON STORAGE BATTERY DIVISION

Thomas A. Edison, Incorporated

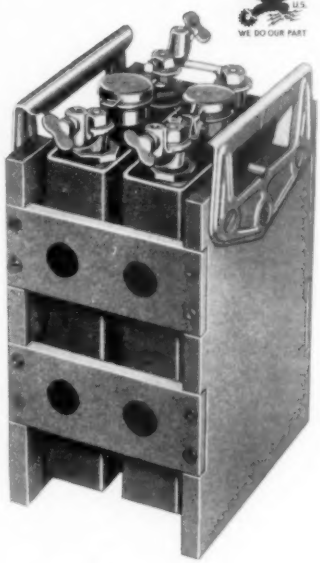
West Orange, New Jersey

EDISON STORAGE BATTERIES IN SCHOOL AND COLLEGE LABORATORY WORK

The Edison Battery is preferred in a great number of school and college laboratories as well as in commercial laboratory work, because of its many outstanding advantages, among which are the following:

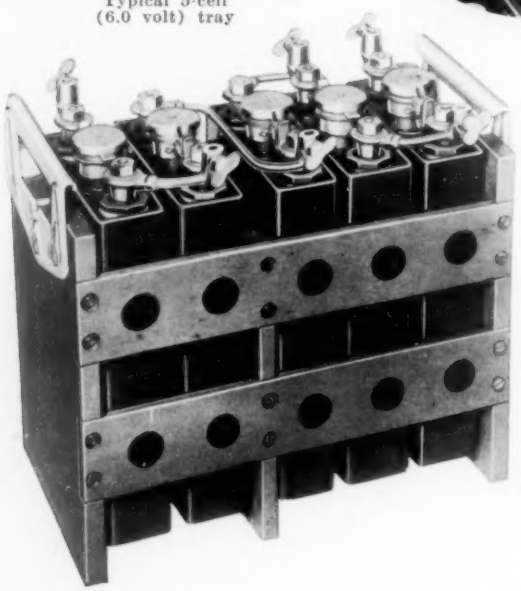
1. It is light in weight, easy to handle—ideal for portable service.
2. Of rugged steel construction, it withstands rough handling and is practically indestructible.
3. It requires no periodic equalizing charges, nor need it be charged when not in use. It can be stored in a discharged condition for months or years without deterioration.
4. At no extra cost a special terminal with wing nut attached is regularly furnished for "B" type cells for laboratory service. (See center illustration.) With this type of terminal, tap-offs can instantly be made from any individual cell or group of cells in the battery without disturbing the regular intercell connections.
5. Tray assembly and cell connections are extremely simple.
6. Owing to its completely reversible chemical cycle, the Edison Battery will withstand electrical abuses which would injure or perhaps ruin other batteries.
7. Freedom from corrosive acid fumes permits battery to be used in close proximity to workers and to delicate apparatus.
8. The Edison Battery is entirely free from ordinary storage battery diseases—requires no renewal of separators throughout its long life—requires no internal cleaning. Maintenance requirements are few.
9. The life of an Edison Battery is so long that its cost per year is low in comparison with that of other batteries. **Many Edison Batteries which were placed in operation more than twenty years ago are still in daily service.**

At Right—
EDISON STORAGE BATTERY
Typical 2-cell (2.4 volt) tray



Below—
Close-up view of special tap-off device attached to connector lug, permitting the tapping off of any number of cells in a tray as desired

Below—
EDISON STORAGE BATTERY
Typical 5-cell (6.0 volt) tray



SCHOOL USES OF EDISON BATTERIES

In school and college laboratories, Edison Batteries are used in large numbers both as an aid to instruction concerning such batteries and as a source of direct current for the students' experiments and for instructors' lecture demonstrations. Edison Batteries are also widely used in school telephone systems, fire drill and alarm systems, time clock systems, program bell and gong systems, and lighting systems where schools are used at night. **Write for our Special Service Bulletins Nos. 102 and 103.**

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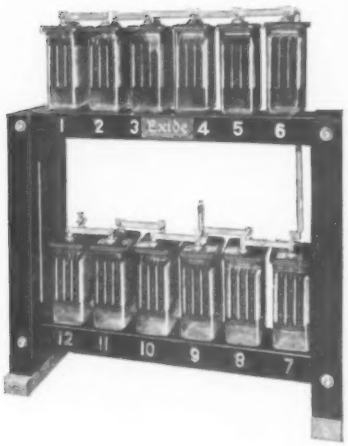

12-CELL EXIDE CHLORIDE BATTERY FOR LABORATORY SERVICE

Exide Batteries are used in the laboratories of the nation's foremost experimental scientists and engineers as well as in the laboratories of our most progressive universities, colleges and schools. The design and construction of Exide Batteries is the result of a wide experience gained through 46 years of building batteries for every purpose.

Exide Laboratory Batteries are absolutely dependable. At all times they assure an adequate, steady flow of current for any experiment which you or your students may be conducting. Furthermore, when installed the battery provides a wide range of voltages using combinations of cells from one to hundreds, thus providing the greatest possible operating flexibility.

Exide Laboratory Batteries can be supplied to furnish any amount of current at any voltage selected.

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Emergency Light
and Power
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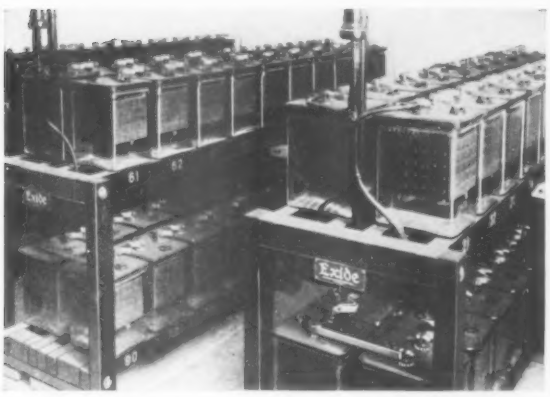

LEFT—120-CELL EXIDE CHLORIDE LABORATORY BATTERY IN USE AT CRUFT LABORATORY, HARVARD UNIVERSITY, CAMBRIDGE, MASS.

RIGHT—AN EXIDE CHLORIDE LABORATORY BATTERY CELL CUT AWAY TO SHOW CONSTRUCTION; SEALED GLASS JAR ASSEMBLY

THE AMERICAN SCHOOL AND UNIVERSITY

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Chemical Stoneware Equipment for handling acids and other corrosive fluids and gases, for use in educational and research laboratories and in industrial plants. Typical items of this equipment include acid jugs, acid pitchers, ball mills, boiling kettles, chlorine generators, dampers, decanting pots, exhausters, filters, funnels, jars, mariotte bottles, percolators, pots, pumps, stills, storage vessels, subliming dishes, tanks, traps, troughs, vats, piping, valves, and fittings.

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A list of the colleges and universities whose laboratories have been equipped with G. C. Chemical Stoneware is practically a roster of our leading institutions of learning, including Yale, Harvard, Columbia, Vassar, Radcliffe, Johns Hopkins, Duke, Purdue, New York, Fordham, Pittsburgh, Lehigh, Tulsa, Vanderbilt, Massachusetts Agricultural, Berea, Toledo, McGill, Wesleyan, Detroit, and the State Universities of New Hampshire, Maryland, Ohio, Tennessee, Wisconsin, Indiana, Nevada, California, and California at Los Angeles, as well as hundreds of smaller institutions, and research and industrial laboratories, throughout the United States and Canada.

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GENERAL CERAMICS COMPANY
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Advantages

General Ceramics Chemicalware is completely and permanently acid-proof. Its attractive smooth surface glaze is homogeneous with the ware itself, and therefore free from crazing or cracking. The body of the ware, as well as the glaze, is acid-proof through and through. General Ceramics ware is mechanically strong, leak-proof, and easy to keep clean, and it cannot contaminate the chemicals being handled. It lasts indefinitely and there is no upkeep or replacement expense.

Service

Our Engineering Department will gladly assist in selecting the right stoneware equipment for any requirement. We cooperate with architects and engineers in laying out laboratories and other buildings where corrosive products are handled, also in the design of special chemical apparatus.

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Write for catalogues of General Ceramics Chemical Stoneware.

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General Office: Schenectady, New York

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G-E EDUCATIONAL SERVICE

The General Electric Company is deeply interested in education, as it recognizes that the future welfare of industry, and of the country as a whole, depends upon how well the students of today are trained for the work of tomorrow. It is the policy of the Company to aid the faculty and students of our schools and colleges in every way possible. To this end, Company publications, motion-picture films, illustrated lectures, etc., are made generally available without charge.

General Electric engineers will be glad to recommend apparatus to meet your special conditions if you will give them details such as: Type of course, number of students, laboratory or shop space available, money at hand for equipment, etc. Further than this, liberal discounts from the regular commercial prices of Company products are allowed to educational institutions. For quotations on apparatus and further information concerning G-E educational service, consult the Educational Specialist at the nearest office of the Company.

ILLUSTRATED LECTURE SERVICE

General Electric Motion Pictures are available without charge to educational institutions. They are particularly valuable to schools and colleges, as they enable the student and teacher to keep informed on all important developments in the electrical field.

Complete information on this service is available in publication GES-402B.

In general the General Electric Company recommends standard apparatus for laboratory instruction. It is recognized, however, that because of its size, cost, and the power required for operation, much commercial apparatus cannot be used in the laboratories of engineering schools and colleges. For this reason, the General Electric Company has given especial attention to the selection for educational use of such standard apparatus as is of suitable size and which will illustrate fundamental principles of design and construction as well as acceptable commercial practice.

Where standard apparatus is not suitable, the General Electric Company has not hesitated to design special apparatus for the electrical laboratory and shop. Among such special equipment may be mentioned the switchboards both for engineering and physics laboratories, special industrial control panels for A-C. and D-C. service, the AHI synchronous motor (or generator), and the 5 kw. rotary converter.

Thus the student is given an opportunity, while becoming familiar with the underlying principles of electrical engineering, to become acquainted with actual construction details. Bulletin GEA-1185A, which has been recently revised, illustrates and describes G-E apparatus particularly adapted for laboratory use.

SELECTION OF ELECTRICAL LABORATORY EQUIPMENT

When deciding on the equipment for an electrical shop or laboratory, Bulletin GEB-62A will be particularly useful. In this booklet will be found listed in six different groups, equipment to meet a wide range of requirements. For the elementary courses a few of the more important types of machines are recommended, together with control apparatus, measuring instruments, and certain machine tools which should be in every electrical shop. For more advanced work, or as funds become available, equipment from other groups may be added to provide well balanced laboratory equipment which will permit a particularly wide range of experiments.

In addition to listing the equipment, this booklet discusses briefly the several items, explaining why they have been selected and the use to which they may be put in the laboratory.

SHOP PROJECTS

The General Electric Company, in carrying out its elaborate educational program, has sponsored the preparation and publication of several construction projects for technical and vocational schools. These projects are exceptionally valuable for the school shop due to the fact that they are not merely assembly projects but involve a certain amount of mechanical dexterity with such tools as the lathe, drill press, tap and die, etc. The projects already issued and available without charge cover:

Educational Projects
¼ H.P. and ¾ H.P. Motors

1) ¼ H.P. Single-Phase, 60 cycle, 110 volt motor. Bulletin GED-379
2) ¾ H.P. 3-Phase, 60 cycle, 110 volt motor. Bulletin GED-534
3) ½ kw. 220-110/55 volt, single-phase, air-cooled transformer. Bulletin GET-128

Kits for these projects can be purchased from the General Electric Company. In addition, complete instructions are given for the securing of any equipment that may not be included in the kit.

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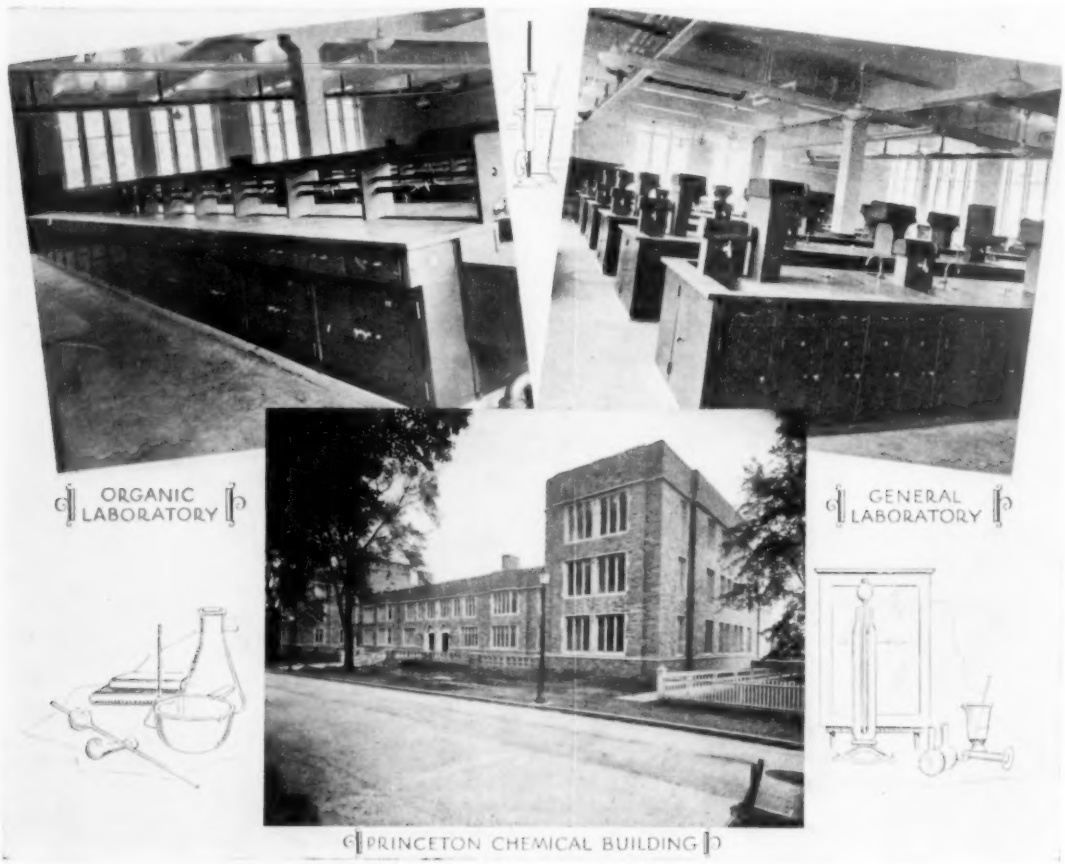
Laboratory Desks and Tables of GF All-steel possess many advantages not common to other types of tables. Doors and drawers never warp, swell or split. Handles never pull off. Drawers never stick to cause broken glassware.

Built on the unit principle to facilitate installation and repairs to plumbing. Of non-combustible construction, they reduce the fire hazards of laboratories. Continuous tops of Alberene stone are proof against acids.

Below are illustrations of this equipment in new Frick Chemical Laboratory, Princeton University.



Charles Z. Klauder, Architect

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For the last ninety-five years the name GRASSELLI has been prominently identified with the Chemical Industry of the United States.

In addition to the large number of Commercial Chemicals produced for industrial use, GRASSELLI has for years produced Chemically Pure Acids for laboratory work. Grasselli Grade Chemically Pure Acids are dependable and uniform. Analyses are shown on all labels.

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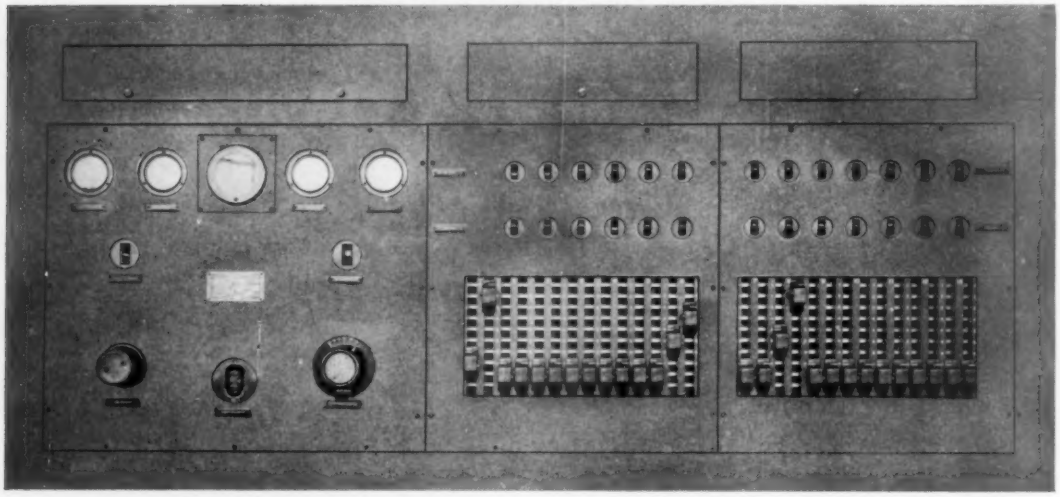
THE AMERICAN SCHOOL AND UNIVERSITY

THE HOLTZER-CABOT ELECTRIC CO.

Boston, Mass.

The Holtzer-Cabot Electric Co., Ltd., Montreal, Canada



Electrical Distribution Equipment for Science Laboratories CORDLESS TYPE

The conducting of electrical experiments in present day High School and College laboratories requires adequate equipment properly installed and connected if best results are to be attained and the time of students and instructors is to be conserved. Since 1910, we have been manufacturing and supplying schools and colleges with electrical equipment and improving the apparatus wherever possible.

Particular attention is invited to the new cordless type distribution panels shown in this bulletin. This type of panel (patent pending) was developed and first exhibited by Holtzer-Cabot at the N. E. A. Convention in Minneapolis in 1933 and is a basic and vital improvement over the plug and cord type panel heretofore used.

In this new type panel the selection of all voltages to be connected to students' tables or instructors' benches is done by switches or sliding plugs which cannot be removed from the panel. Not only does this eliminate all plugs and cords with their inevitable upkeep expense and occasional loss, but by means of careful design the new panel positively eliminates any possibility of wrong connections or reversed polarity. It is not possible by any manipulation of switches or sliders to get more than one voltage on any bench circuit at the same time. All equipment is rated and tested for 30 amperes at 115 volts.

With the elimination of plugs and cords and by improving the motor generator and battery control panel we are now able to install any panel in a case not over 7″ deep, thus making these panels entirely practical for installing flush in laboratory walls. As these panels are of the dead front type, the glass paneled doors usually furnished for cord type panels are unnecessary and are not furnished.

Referring to cut on page above, it will be seen that there are two sliding plugs for each bench circuit—one colored red and the other green; the red being positive. By sliding the plugs to the proper position plainly marked on panel front and plugging them in, any battery voltage from 2 to 24 can be connected to bench circuits. The switches marked "AC" are so connected that in the "up" position they connect the bench circuits to the "AC" line and in the "down" position the bench circuits are transferred to the "DC" switches below. The "DC" switches operate in the same manner, connecting when in the "down" position the bench circuits to the battery voltage section below.

Holtzer-Cabot cord type panels have been continually improved and are now furnished with special heavy duty receptacles, securely locked to the panel so as to prevent any chance of loosening or turning. Special plugs and receptacles up to 200 ampere capacity can be furnished.

All equipment is listed and approved by the Underwriters' Laboratories.

MAURICE A. KNIGHT

Acid and Alkali Proof Chemical Stoneware

227 Kelly Avenue, Akron, Ohio

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KNIGHT-WARE — "IT IS THE BODY ITSELF"

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FIG. 272D—TWIN ELBOW

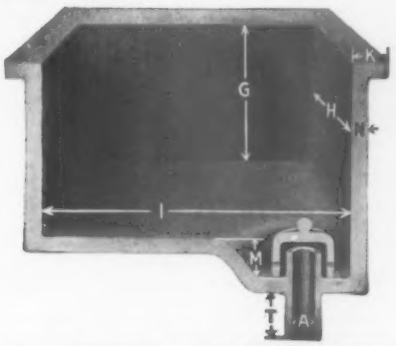

FIG. 235—ACID-PROOF LABORATORY SINK WITH LUTE TRAP OUTLET

PRODUCTS

Pipe and Fittings for Laboratory Waste Lines and Fume Ducts.

Custom Built One-piece Laboratory Sinks.

Laboratory Table Troughs.

Sumps or Dilution Basins.

Jars, Filters, Gas Generators, Tanks, Burner Guards, etc.

SERVICE

If you are building a new laboratory or refurnishing your present one, we offer you our knowledge and practical experience gained through scores of Knight-Ware installations.

DEAIRATED KNIGHT-WARE

Deairated Knight-Ware is an improved ceramic product having a dense, uniform body which is tough, thoroughly vitrified and wholly inert to the action of acids, alkalis, and corrosive solutions and gases, weak or strong, hot or cold. Its acid-proof qualities do not depend upon any glaze, enamel, or veneer, "It is the body itself". Deairated Knight-Ware is not brittle or fragile as ordinary tile, and is equaled only by glass or fused silica in chemical inertness. An installation of Knight-Ware properly made is trouble-free and permanent.

Our 48-page fully illustrated laboratory equipment catalog will be sent upon request.

SOME NOTABLE INSTALLATIONS OF KNIGHT-WARE EQUIPMENT

Columbia University
Princeton University
Purdue University
McGill University
Ohio State University
Johns Hopkins University
University of California
University of Detroit
West Virginia University
Columbia Presbyterian Hospital Center
New York-Cornell Medical Center
Mellon Institute of Industrial Research

THE MATHESON COMPANY, INC.

East Rutherford, N. J.

Compressed Gases

BULLETIN NO. II

Ammonia	Ethane	Isobutane	Oxygen
Argon	Ethyl Chloride	Isopentane	Pentane
Butane	Ethylene	Methane	Phosgene
Butylene	Ethylene Glycol	Methyl Chloride	Pictet's Fluid
Carbon Dioxide	Ethylene Oxide	Neon	Propane
Chlorine	Helium	Nickel Carbonyl	Propylene
Dimethyl Ether	Hydrogen	Nitrogen	Resusiten
	Hydrogen Sulfide	Nitrous Oxide	Sulfur Dioxide

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We also Service Control Repairs

GASOMETER EQUIPMENT FOR LIQUID HYDROGEN SULFIDE SUPPLY

For classroom use ask for Bulletin No. I. For individual use see Bulletin No. II. GASOMETERS are now the accepted form of sulfuretted Hydrogen supply. Available in 5 sizes of cylinders.

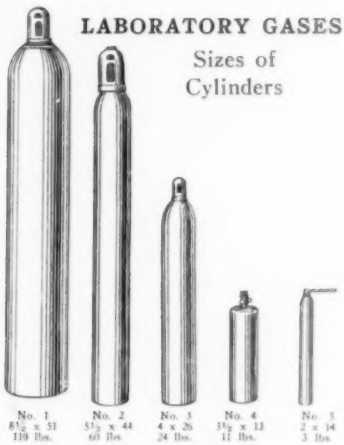
BULLETIN NO. I

BULLETIN NO. XI

NA VALVE

LABORATORY GASES

Sizes of Cylinders



BULLETIN NO. II

REDUCING VALVES

BULLETIN NO. XI

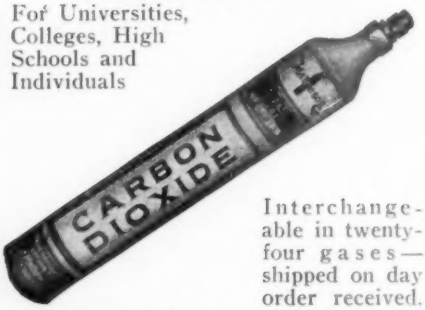
OXY-GAS TORCH

BULLETIN NO. XIV

GAS DEPARTMENT

THE LECTURE BOTTLE

For Universities, Colleges, High Schools and Individuals



Interchangeable in twenty-four gases—shipped on day order received.

On account of its convenience it has become Standard Laboratory equipment. It does not need a regulator—its valve being delicate enough to permit close adjustment without one.

BULLETIN NO. II

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Philadelphia
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Manufacturing Chemists

Rahway, N. J.

In Canada:
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7 ADVANTAGES IN THE NEW CONTAINERS OF MERCK LABORATORY CHEMICALS

Merck Laboratory Chemicals are now packaged in specially-designed containers which offer these seven important advantages:

1. Amber Color Glass
2. Non-metallic screw cap
3. Will not corrode
4. Easy to open
5. Special liner ensures air-tight sealing
6. Dust-proof
7. Attractive appearance

The amber color glass bottles afford maximum protection against light and other deteriorating agents. The non-metallic screw caps were designed to overcome corrosion resulting from unfavorable atmospheric conditions and from vapors present in the laboratory. The large facets on the side of the cap make it easy to open the bottle.

A special liner, impervious to the chemical, ensures air-tight sealing when the handy cap is replaced.

The cap extends over the lip of the bottle, thus preventing an accumulation of dust.

Merck Laboratory Chemicals in these new amber glass bottles, with their black caps and blue and white labels, will add to the attractive appearance of your laboratory or stock room.

Your wholesaler is ready to supply you.

THE NEW BRITAIN MACHINE CO.

Manufacturers of

Industrial Arts, Vocational and Trade School Equipment

New Britain, Conn.

The "New Britain" line of Steel School Shop Equipment is built around the original New Britain designed and patented (No. 1887399) Type "O" square tubular steel sanitary bench leg.

"New Britain" Industrial Arts, Vocational, and Trade School equipment includes benches and tables for Machine Shop—Auto Repair Shop—Forge Shop—Woodworking Shop—Science Dept.—Drawing Room—Art Room—Plumbing Shop—Electrical Work—Blacksmithing—Welding and Laboratory work in all branches.

There is a New Britain bench for every school shop need, more than 700 different designs and sizes being available.

Patent No. 1887399 and Patent Pending

DRAWING TABLE NO. 9655

New Britain drawing tables are available in 50 sizes and designs; with stationary or adjustable tops, with or without individual students tool drawers, with or without large general drawer, and with or without drawing board compartments. **All steel** construction from floor to the wood top.

"New Britain" Cabinet Benches may be had in 250 different sizes and combinations, with one, two or three shelves, steel sliding doors (swinging doors also available), doors at front, back, or on sides, or without doors, but with shelves, end panels and back panels, for use in classroom, laboratory, machine shop, garage, etc.

Patent No. 1887399 and Patent Pending

CABINET BENCH NO. 9502
24" wide x 6' long x 32" high
Standard Lengths—3', 4' 6", 6', 9', 12'
Standard Widths—24", 30", 36", 42", 48"
Standard Height—32"

Patent No. 1887399

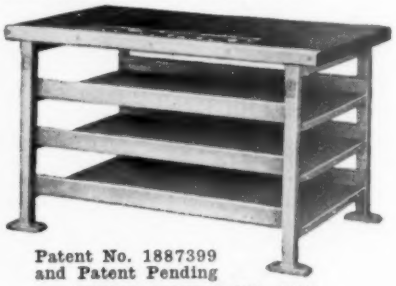
CONTINUOUS BENCHING

Send for Catalog No. 707SE

Patent No. 1887399 and Patent Pending

MANUAL TRAINING BENCH NO. 94212P

Manual training equipment should be of steel to meet modern demands for **safe, sanitary** and **fireproof** working implements. New Britain manual training benches are **all steel,** except for the laminated maple top. Bench No. 94212, shown here, is one of 75 different designs ranging from single student benches with steel legs and maple top only, through a wide variety of combinations, with from one to sixteen drawers.



Patent No. 1887399 and Patent Pending

STAKE BENCH NO. 9600
30" x 6' x 32" high
Standard Lengths—6', 9', 12'
Standard Widths—30", 36", 42"
Standard Height—32"

Maple Top 2¼" thick, Pexto or Niagara Stake Plates, angle iron edges rabbetted flush with top and edge; Type O Tubular Steel Sanitary Bench Legs, and steel shelves, edges turned up.

"New Britain" Work Benches may be had with ⅛" steel tops, 1¾", 2¼" or 2⅝" laminated maple tops, or a combination of both with maple front vise plank and ⅛" steel at rear, in a wide range of sizes and combinations. Arranged individually, or continuously as shown here, they are most useful and economical.

RAWSON ELECTRICAL INSTRUMENT CO., INC.

ESTABLISHED 1918

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TYPE 501 MICROAMMETERS, MILLIAMMETERS MILLIVOLTMETERS, and VOLTMETERS

Single Ranges—
From 3 microamperes to 1 ampere, full scale.
From 1 millivolt to 1000 volts, full scale.

Multi-ranges—
From 4 microamperes to 1 ampere, full scale.
From 2 millivolts to 1000 volts, full scale.

Multimeters — 14 Ranges—
20 microvolts to 1000 volts.

TYPES 501, 502, 504 and 520
1 microampere to 1 ampere.

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Can be used on A.C. or D.C.

Single Ranges—
From 1 milliampere to 1 ampere, full scale.
From 0.25 volt to 1500 volts, full scale.

Multi-ranges—
From 2 milliamperes to 1 ampere, full scale.
From 0.3 volt to 1500 volts, full scale.

Multimeters—14 Ranges—
From 2 milliamperes to 5 amperes.
From 60 millivolts to 1500 volts.

TYPE 515 THERMOCOUPLES

In Vacuo—From 2 milliamperes to 1 ampere.
In Air—From 0.5 ampere to 10 amperes.
Specials—For use on short wave frequencies.

TYPE 504 FLUXMETERS

For measurement of magnetic flux in maxwells or gausses, with electrical zero return. These are strictly portable and need no leveling.

TYPE 505 SWITCHBOARD PATTERN METERS and TYPE 507 SMALL METERS

TYPE 505

TYPE 507

Same ranges as Type 501. These cannot be supplied with internally mounted thermocouples.

TYPE 520 WATTMETERS—From 0.1 watt full scale up. Especially suitable for use on circuits having low power factors.

TYPE 520 DYNAMOMETER MILLIAMMETER and VOLTMETERS—From 10 milliamperes and 0.5 volt up; full scale.

OHMMETERS, TYPE 701—With self-contained battery and magnetic shunt to compensate for battery ageing. Suitable for measuring low coil resistances up to insulation resistance in megohms.

TYPE 704—Cross coil, independent of ± 20% battery ageing. From 1 ohm to 1000 megohms.

TYPE 508 ELECTROSTATIC VOLTMETERS

No power consumption on D.C. and very little on A.C. Full scale ranges from 120 to 3000 volts, and up to 40,000 volts by the use of condenser multipliers. Measures true R.M.S. values. Special high ranges built on request.

TYPE 508

TYPE 503 SEMI-SUSPENDED MICROAMMETERS MILLIAMMETERS and MILLIVOLTMETERS

The most sensitive portable meters manufactured. Although movement is carried on a suspension, the meter needs no leveling. Full scale ranges from 0.5 microampere and 0.1 millivolt up. Also supplied in multiranges.

Type 5053—Similar to Type 505 but with semi-suspension element. Ranges from 0.75 microampere and 0.24 millivolt up.

Type 5073—Similar to Type 507 but with semi-suspension element. Supplied in same ranges as Type 503. Price approximately 30% less than Type 503.

TYPE 503

HIGH SENSITIVITY RAWSON-GREIBACH METERS FOR A.C. OR D.C.

Works on an entirely new principle, employing two vacuum tubes as rectifiers only, but arranged in such a way that true R.M.S. values are obtained.

Each meter carries its own filament supply source good for approximately 1000 hours use.

No plate batteries.

No amplification of any kind used.

Very much less energy used than with other A.C. meters.

The meter can be checked on D.C.

Measures currents from 6 microamperes up and Potentials from 60 microvolts up.

Will withstand overloads over 10,000%.

TYPE 602

SPENCER LENS COMPANY

Manufacturers of
MICROSCOPES—MICROTOMES—DELINEASCOPES
Buffalo, N. Y.

BRANCHES
New York Chicago Boston San Francisco Washington

SPENCER MICROSCOPES FOR HIGH SCHOOL AND COLLEGE USE

The Spencer Lens Company have been pioneers in microscope-building, the first Spencer microscopes being made more than 75 years ago. They were the first to build apochromatic objectives; the first, and for a dozen years the only, manufacturer in America to build microscopes with side fine-adjustments; the originators of the attachable mechanical stage that clamps on the side of a microscope; the originators and only builders of fork-type substages, converging tube binocular microscopes, combination binocular and monocular body all in one, combination substage condenser and dark-field illuminator. In short, most of the improvements in microscope construction during recent years have originated in our factory.

Most laboratory workers prefer Spencer microscopes not merely because the Spencer Company were pioneers, but because they have continued to pioneer all down through the years to the present day.

SPENCER NOS. 55 AND 56

SPENCER NOS. 55 AND 56

These exceptionally large instruments meet in a most satisfactory way the demand for a large stage. The plate glass stage is 100 mm. x 100 mm. Objects in the center of a dish 50 mm. high and 130 mm. in diameter may be brought into the lines of vision. (Illustrated above.)

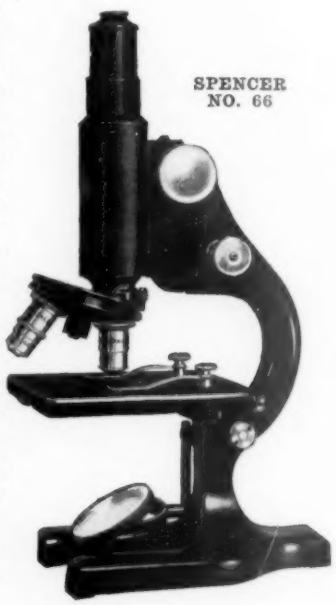
SPENCER NO. 33-MH

Embodies all features essential for practical diagnosis. Features the exclusive Spencer constructional advantages: (1) Balanced Optical System, (2) Dual-Cone Nosepiece, (3) Fork-Type Substage and (4) new Rhodium Plated Parts. Mechanical stage has range sufficient to cover 3″ x 2″ microscope slide. Has micrometer fine adjustment with twenty-seven threads completely engaged. It is the finest microscope for the medical student's use.

SPENCER NO. 33-MH

SPENCER NO. 66

For elementary work, precisely built and durable, it serves the same purpose as more expensive instruments. Standard size in every respect. Standard Spencer objectives and eyepieces; rotatable disc diaphragm. Fine adjustment has twenty-seven threads of the screw engaged instead of the usual six. Simple in operation, it is the finest instrument for students untrained in handling a microscope.



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STANDARD SCIENTIFIC SUPPLY CORP.

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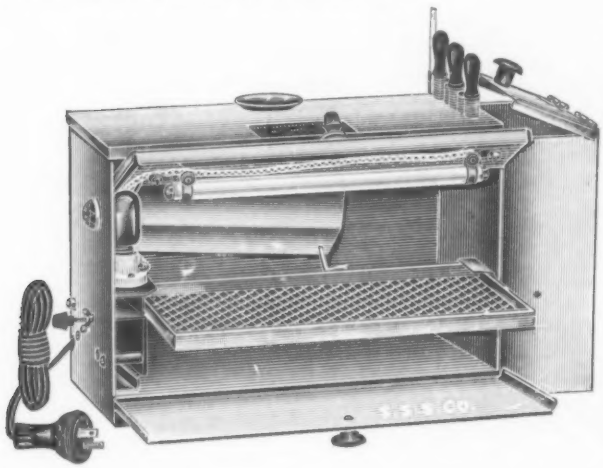
A FEW OF OUR SPECIALTIES

HUETTNER PARAFFIN DESK OVEN



No. 6601. Oven, Huettner Paraffin, for embedding purposes. Designed by Prof. Alfred F. Huettner of New York University. This is an efficient and reliable paraffin oven incorporating many features not found in any manufactured today. Recommended for individual or class use, for such work as embedding, filtering paraffin, spreading, sections, and drying slides. Many institutions have **adopted this oven for laboratory use.** Some of the important features are:

1. Constructed of non-rusting monel metal.
2. Uses heating coil instead of lamps.
3. Has a thermostat for automatic temperature control.
4. Pilot light illuminates the inside of oven.
5. Separate drying chamber accommodating 50 slides.
6. Convenient size:—16″ x 8″ x 6″ inside.
7. Can be used for Feulgen reaction.

Price **$32.00**
Quantities of 6 ..... Less 10%
Quantities of 12 ..... Less 15%

"STANSCIEN" MICROSCOPIC SLIDES —Non-corrosive, hard white slides at $1.00 per gross.

"STANSCIEN" NON-CORROSIVE COVER LASSES
at $1.00 per oz., No. 1 thickness.
at .80 per oz., No. 2 thickness.

PETRI DISHES—Hard glass, heat resistance, for repeated sterilization.
Size 100 x 10 mm., $2.00 doz., $22.00 gross
Size 100 x 15 mm., $2.00 doz., $22.00 gross

"STANSCIEN" RUBBER TUBING, highest quality—all sizes from 1/8″ x 1/16″ at $1.50 per lb.

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THE UNITED STATES STONEWARE CO.

Master-Craftsmanship in Ceramics Since 1865

New York Office: 50 Church Street — Works: Tallmadge, Ohio

Acid-proof Chemical Stoneware Laboratory Sinks (One-Piece)—Made of De-aired Clays for Maximum Density and Greater Strength

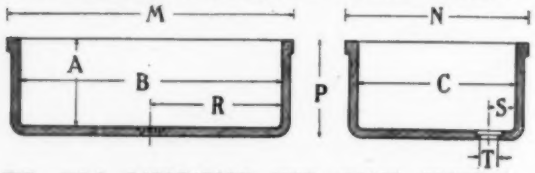


FIG. 112-A—*LABORATORY SINK (PLAIN COUNTERSUNK OUTLET TO TAKE LEAD PLUG)—MADE WITH OR WITHOUT INTEGRAL BACKS AND INTEGRAL DRAINBOARDS*

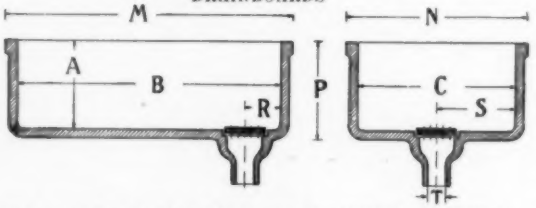


FIG. 112-B—*LABORATORY SINK (WITH INTEGRAL NIPPLE AND REMOVABLE STRAINER)—MADE WITH OR WITHOUT INTEGRAL BACKS AND INTEGRAL DRAINBOARDS*

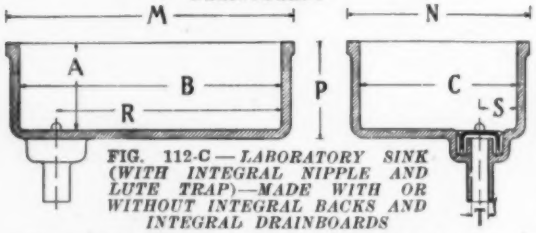


FIG. 112-C—*LABORATORY SINK (WITH INTEGRAL NIPPLE AND LUTE TRAP)—MADE WITH OR WITHOUT INTEGRAL BACKS AND INTEGRAL DRAINBOARDS*

Glaze—Our standard "HY-GLOSS" high luster salt glaze is dark brown in color, and is an integral part of the body itself.

Guarantee—"U. S. Standard" acid-proof chemical stoneware is unqualifiedly guaranteed to be acid, alkali and corrosion-proof throughout the entire stoneware body—with or without the salt glaze.

Acid-proof Piping for Acid Waste and Ventilating Lines (De-aired and Vacuumized for Greater Strength)

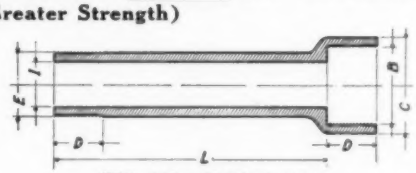


FIG. 149—*SOCKET PIPE*

Our Acid-proof Chemical Stoneware Piping is the ideal material for Acid Waste and Ventilating Lines. There is no other commercial product which is as universally resistant to acids, alkalies and corrosive chemicals and gases.

Bromine, ferric chloride, sulphuric, sulphurous, nitric and hydrochloric acids of any concentration or temperature, can all be handled with perfect safety. "U. S. STANDARD" Chemical Stoneware Piping is free from all the limitations of brass, rubber, cast iron, lead and high silicon irons. There are no hazards, no leaks and no repairs.

Standard pipe lengths are 60 inches. The hubs are 4 inches deep and both the spigot and hub ends are deeply corrugated. Joints are economically made and easily poured with our "CALK-TITE" Acid-proof Caulking Compound. **The first cost of "U. S. STANDARD" Chemical Stoneware Piping is decidedly lower than for metallic substitutes.**

Our line is complete, including Elbows, Bends, Y's, TY's, Traps, Crosses, Sumps, Floor Drains, Ventilating Caps, Dampers, Kjeldahls, etc.

Write for BULLETIN NO. 515 describing our entire Laboratory Line, including Museum Jars, Distilled Water Tanks, Acid Jars, H_2S Gas Generators, Acid Pitchers, Laboratory Jar Mills, "Vorce" Laboratory Chlorine Cells, Kjeldahl Equipment, Sink Troughs, Suction Filters, Funnels, etc.

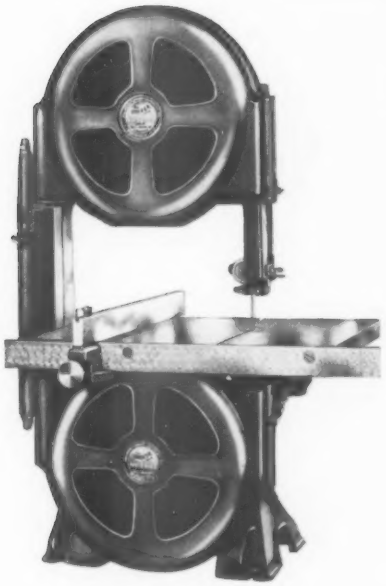
LIST PRICES ON ACID-PROOF SINKS (F. O. B. TALLMADGE, OHIO)

Size No.	B	C	A	M	N	P	Code WORD	Fig. 112-A Plain Code—ZEST	Fig. 112-A With Integral Backs	Fig. 112-B Plain Code—ZONE	Fig. 112-B With Integral Backs	Fig. 112-C Plain Code—ZURO	Fig. 112-C With Integral Backs
700	11	9	8	14	12	9	TAB	$14.00	.....	.....	.....	.....	.....
701	14	10	6	17	13	7	TACIT	14.00	.....	.....	.....	.....	.....
702	16	8	6	19	11	7	TACK	15.00	.....	.....	.....	.....	.....
703	15	14	6	18	17	7	TAFFY	17.00	.....	.....	.....	.....	.....
704	16	12	6	19	15	7	TAG	17.00	.....	.....	.....	.....	.....
705	16	16	9	19	19	10	TALE	24.50	.....	.....	.....	.....	.....
706	18	10	11	21	13	12	TALON	23.00	$27.00	$28.00	$32.00	$30.00	$34.00
707	18	14	7	21	17	8	TAMP	23.00	27.00	28.00	32.00	30.00	34.00
708	18	14	10½	21	17	11½	TANG	29.00	33.00	34.00	38.00	36.00	40.00
709	18	16	6	21	19	7	TAPE	24.00	28.00	29.00	33.00	31.00	35.00
710	20	12	7	23	15	8	TALLY	21.00	25.00	26.00	30.00	28.00	32.00
711	20	12	12	23	15	13	TAR	28.00	32.00	33.75	37.75	35.75	39.75
712	20	16	7	23½	19¼	8¼	TAUNT	22.00	26.25	27.75	32.00	29.75	34.00
713	24	15	8	27½	18½	9¼	TENOR	24.50	28.75	30.25	34.50	32.25	36.50
714	32	16	7	35½	19½	8¼	TERSE	32.00	37.00	37.75	42.75	39.75	44.75
715	30	20	8	33½	23½	9¼	THUMB	38.00	44.00	44.50	50.50	46.50	52.50
716	36	18	7	39½	21½	8½	TIGER	41.00	47.00	47.50	53.50	50.50	56.50
717	42	20	12	45½	23½	13¾	TOAST	72.00	80.00	80.00	80.00	84.00	92.00

All dimensions in inches. **Prices subject to discount.** Code Word for Sinks with Integral Back: Add "SPLASH." Drainboards: All sinks are available with integral ceramic drainboards on one or both sides. Special sizes and designs made to order.

WALKER-TURNER CO., INC.

639 South Ave.
Plainfield, New Jersey



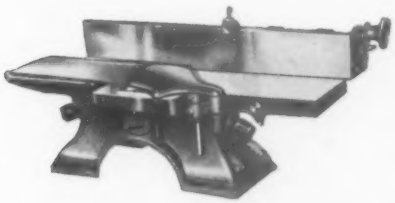
12″ BAND SAW

Six SKF ball bearings assure accurate work, indefinitely. Wheels are carefully balanced. Frame is cast iron, tubular type. Table size 12½″ x 12″. Distance upper guide to table 6″. Extra quality characterizes every feature.

10″ BENCH SAW

Maximum cutting capacity 3″. Spindle ¾″ diameter between bearings. Worm gear tilts table, another raises and lowers arbor. Table size 21″ x 15″ (31″ x 21″ available).

"DRIVER" bench type woodworking tools are ideal for the school shop. They embody modern design, finest materials and proven dependability. Yet they are priced so low that practically every budget can carry them. Whether your program involves an immediate investment in power tools or not, write for new catalog and see the outstanding features these remarkable tools provide.

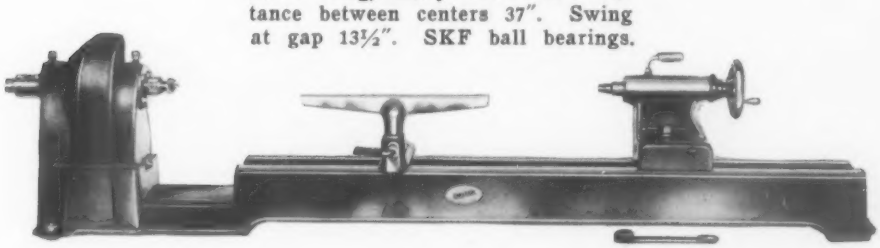


4″ BALL-BEARING JOINTER

This jointer has a three-knife solid steel head turning on SKF ball bearings. High speed steel knives. Length overall 28″. Both tables adjustable. Guard dropped down for rabbeting.

WOOD OR METAL WORKING LATHE

Metal spinning attachments and a compound slide rest are available for this heavy woodturning lathe. Bed is 54″ long, heavy cast iron. Distance between centers 37″. Swing at gap 13½″. SKF ball bearings.



WESTON ELECTRICAL INSTRUMENT CORP.

601 Frelinghuysen Avenue, Newark, N. J.

ENGINEERING AND SALES OFFICES

Albany, Atlanta, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Denver, Detroit, Honolulu, T. H., Jacksonville, Kansas City, Knoxville, Los Angeles, Meriden, Conn., Minneapolis, Newark, N. J., New Orleans, New York, Philadelphia, Pittsburgh, Rochester, St. Louis, San Francisco, Seattle, Syracuse

WESTON—THE WORLD'S STANDARD IN ELECTRICAL MEASUREMENT

The use of Weston instruments in educational work and scientific laboratories has become a fixed principle, for nothing short of Weston accuracy and dependability are acceptable for engineering training. Weston instruments are made to most exacting standards of craftsmanship and accuracy. They inspire students to be exact in experiments. And in using Westons in training, the student is familiarizing himself with the instruments he will use all through his engineering career, for student graduates since 1888 have "Westonized" the industrial world.

Illustrated are a few of the many Weston models particularly recommended for educational use. Catalogs describing all models are available.

MODEL 540 PORTABLE D. C. VOLT-AMMETERS (Fuse-Protected)

Made with six ranges. Independent replaceable fuses protect each of the three current and three potential ranges. Solid, compact Bakelite case. Instrument provided with mirror scale. Quick range-changing switch. Precision type, pocket-size instrument. Reasonably priced.

MODEL 155, PORTABLE A. C. AMMETERS AND VOLTMETERS

For general alternating current testing. Movable iron type. Accuracy, within ½ of one per cent. For use on commercial frequencies. Can also be used for direct current testing.

MINIATURE PORTABLE A. C. TEST SETS

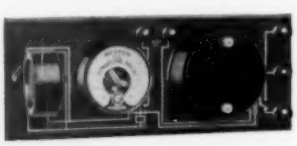
Handy, compact, light-weight instruments enclosed in durable Bakelite cases, furnished with leather case. Model 539 Current Transformer; Model 528 One-Ampere Ammeter; Model 528 Voltmeter. Testing range from 0.2 to 200 amperes. Voltmeters can be supplied in various combinations of voltages. All instruments can be ordered singly, if preferred.

MODEL 45 PORTABLE D. C. AMMETERS AND VOLTMETERS

Permanent magnet movable coil type instruments for general testing. Shielded from the effects of external magnetic fields. Accuracy, within ½ of one per cent.

MODEL 607 * PHOTRONIC PHOTOELECTRIC RELAY

Ideal to demonstrate the theory and operation of photoelectric cells and sensitive relays. Consists of a Weston Photronic Cell of the self-generating type, a Weston Sensitive Relay and a Power Relay. The cell has permanent electrical characteristics and unlimited life. No outside voltage, nor troublesome amplifier required. All mounted on a common base and wired. Wiring diagram engraved on base. Low priced.



* PHOTRONIC — a registered trade-mark designating the photoelectric cells and photoelectric devices manufactured exclusively by the Weston Electrical Instrument Corp.

WICKES BROTHERS

Manufacturers of

Continuous Electric Blueprinting Machines

SAGINAW, MICH.

Established 1856

PRODUCTS

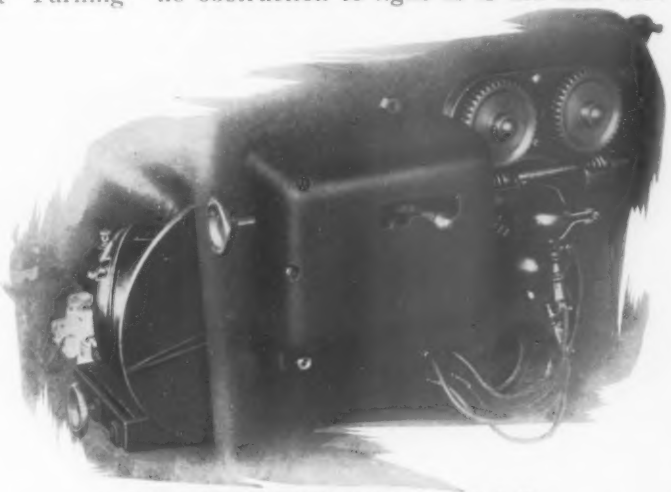
Wickes Continuous Electric Blueprinting Machines, Heavy-Duty Plate Working Tools, Heavy-Duty Engine Lathes, Special Production Lathes, Crankshaft Turning Equipment, Gang Saws.

WICKES BLUEPRINTING MACHINES

Operation. — The Wickes continuous electric blueprinting machine will print separately cut sheets or continuous rolls in any length and in widths from 2 to 48 inches. It is entirely automatic, the only work required of the operator being the placing of tracing and paper on the traveling belt which carries them to the feed roller around the printing cylinder, in which is mounted the lighting element. The printed paper is then delivered to a light-tight storage compartment and the tracing returned to operator or to the storage compartment as desired.

WICKES CONTINUOUS ELECTRIC BLUEPRINTING MACHINE

Printing Cylinder.—The printing cylinder is composed of spirally disposed wires woven from either side to center, mounted stationary in machine, offering practically no obstruction to light as is the case with glass cylinder, the paper and tracing passing over 92 per cent of the circumference of the cylinder.



FOUR-STEP QUICK-CHANGE GEAR BOX

Advantages of Wickes Continuous Electric Blueprint Machine.—Operator not required to work in darkened room.

Operation of machine so simple that any inexperienced operator can make perfect prints.

Operator can start, stop, reverse, increase and decrease speed of machine without changing his position.

The variable-speed, four-step, quick-change gear box allows belt speed adjustment to suit any grade of paper including Vandycks.

Power consumption of motor and lamps reduced to a minimum. Manufactured in one size with floor space 2 ft. 6 in. x 5 ft. x 30 in. high, and two models readily interchangeable. Lighting elements are mercury vapor lamps of standard pattern, each lamp controlled separately.

Machines shipped on 30 days' free trial to approved credit risks.

Catalogs sent upon request fully describing our machines.

Section IX

COLLEGE, UNIVERSITY AND NORMAL SCHOOL PRESIDENTS

In the United States and Canada, for the 1934-1935 College Year

(Normal school principals are designated by an asterisk)

City	*Institution*	*President*
Alabama		
Athens	Athens College for Young Women	E. R. Naylor
Auburn	Alabama Polytechnic Institute	J. J. Wilmore, Chmn.
Birmingham	Birmingham-Southern College	Guy E. Snavely
Birmingham	Howard College	T. V. Neal
Daphne	State Normal School	D. R. Murphey
Florence	State Teachers College	H. J. Willingham
Jacksonville	State Teachers School	C. W. Daugette
Livingston	State Teachers College	G. W. Brock
Marion	Judson College	L. G. Cleverdon
Montevallo	Alabama College	O. C. Carmichael
Montgomery	State Teachers College	H. C. Trenholm
Montgomery	Woman's College of Alabama	Walter D. Agnew
Normal	State Agricultural & Mechanical Institute	J. F. Drake
Selma	Selma University	Wm. H. Dinkins, Ex. Officer
Spring Hill	Spring Hill College	John J. Druhan
Talladega	Talladega College	Buell G. Gallagher
Troy	State Teachers College	E. M. Shackelford
Tuskegee	Tuskegee Institute	Robert R. Moton
University	University of Alabama	George H. Denny
Arizona		
Flagstaff	Arizona State Teachers College	Thomas J. Tormey
Tempe	Arizona State Teachers College	Grady Gammage
Tucson	University of Arizona	H. LeRoy Shantz
Arkansas		
Arkadelphia	Henderson State Teachers College	J. P. Womack
Arkadelphia	Ouachita College	James R. Grant
Batesville	Arkansas College	W. S. Lacy
Clarksville	The College of the Ozarks	Wiley Lin Hurie
Conway	Arkansas State Teachers College	H. L. McAlister
Conway	Hendrix College	J. H. Reynolds
Fayetteville	University of Arkansas	John C. Futrall
Little Rock	Arkansas Baptist College	S. P. Nelson
Little Rock	Little Rock College	John J. Healy
Morrilton	Harding College	J. N. Armstrong
Pine Bluff	Agricultural, Mechanical and Normal College	John B. Watson
California		
Angwin	Pacific Union College	Walter I. Smith
Arcata	Humboldt State Teachers College	Arthur S. Gist
Berkeley	Pacific School of Religion	H. F. Swartz
Berkeley	University of California	Robert G. Sproul
Chico	State Teachers College	A. J. Hamilton
Claremont	Claremont Colleges	James A. Blaisdell
Claremont	Pomona College	C. K. Edmunds
Claremont	Scripps College	Ernest J. Jaqua
Fresno	State Teachers College	F. W. Thomas
Hollywood	Immaculate Heart College	Sister Mary Redempta
La Verne	La Verne College	Ellis M. Studebaker
Los Angeles	Chapman College	Cecil F. Cheverton
Los Angeles	College of Medical Evangelists	Percy T. Magan
Los Angeles	College of Osteopathic Physicians and Surgeons	L. Van H. Gerdine
Los Angeles	Loyola University at Los Angeles	Hugh M. Duce
Los Angeles	Mount St. Mary's College	Sister Margaret Mary
Los Angeles	Occidental College	Remsen D. Bird
Los Angeles	University of California at Los Angeles	Ernest C. Moore, V. Pres. & Provost
Los Angeles	University of Southern California	R. B. von KleinSmid
Oakland	College of the Holy Names	Sister Mary Redempta
Oakland	Mills College	A. H. Reinhardt
Pasadena	California Institute of Technology	Robert A. Millikan, Ch. Exec. Council
Pasadena	Pasadena College	H. Orton Wiley
Redlands	University of Redlands	Clarence Howe Thurber
St. Mary's College	St. Mary's College	Brother Jasper
San Diego	State Teachers College	Edward L. Hardy
San Francisco	State Teachers College	Alex. C. Roberts
San Francisco	San Francisco College for Women	Mother M. Guerin
San Francisco	University of San Francisco	Harold E. Ring
San Jose	State Teachers College	T. W. MacQuarrie
San Rafael	Dominican College	Mother M. Raymond
Santa Barbara	State Teachers College	Clarence L. Phelps
Santa Clara	University of Santa Clara	James J. Lyons
Stanford Univ.	Stanford University	Ray Lyman Wilbur
Stockton	College of the Pacific	Tully C. Knoles
Whittier	Whittier College	W. O. Mendenhall
Colorado		
Alamosa	Adams State Teachers College	Ira Richardson
Boulder	University of Colorado	George Norlin
Colorado Spgs.	Colorado College	Thurston J. Davies
Denver	Regis College	J. A. Herbers
Denver	University of Denver	F. M. Hunter
Fort Collins	Colorado Agricultural College	Charles A. Lory
Golden	Colorado School of Mines	M. F. Coolbaugh
Greeley	Colorado State Teachers College	G. W. Frasier
Gunnison	Western State College of Colorado	C. C. Casey
Loretto	Loretto Heights College	Mother Ann Francis
Connecticut		
Danbury	State Normal School	L. D. Higgins *
Hartford	Hartford Theological Seminary	Rockwell H. Potter, Dean
Hartford	Trinity College	Remsen B. Ogilby
Middletown	Wesleyan University	J. L. McConaughy
New Britain	The Teachers College of Connecticut	Herbert D. Welte *
New Haven	Albertus Magnus College	Sister M. Isabel
New Haven	Arnold College for Hygiene & Physical Education	Wm. H. Mandrey
New Haven	Berkeley Divinity School	Wm. P. Ladd
New Haven	Connecticut College of Pharmacy	Henry S. Johnson
New Haven	State Normal School	Lester K. Ade *
New Haven	Yale University	James R. Angell
New London	Connecticut College	Katharine Blunt
New London	United States Coast Guard Academy	Randolph Ridgely, Supt.
Storrs	Connecticut State College	C. C. McCracken
Willimantic	State Normal School	George H. Shafer *
Delaware		
Dover	State College for Colored Students	R. S. Grossley
Newark	University of Delaware	Walter Hullihen
District of Columbia		
Washington	The American University	Joseph M. M. Gray, Chancellor
Washington	Catholic Sisters College	Patrick J. McCormick, Dean
Washington	Catholic University of America	James H. Ryan, Rector
Washington	Gallaudet College	Percival Hall
Washington	Georgetown University	Coleman Nevils
Washington	George Washington University	Cloyd Heck Marvin
Washington	Howard University	M. W. Johnson
Washington	National University	Hayden Johnson, Chancellor
Washington	Trinity College	Sister Berchmans Julia
Washington	Washington Missionary College	H. H. Hamilton
Washington	J. O. Wilson Teachers College	Edgar C. Higbie

City	Institution	President
Florida		
Coral Gables ..	University of Miami	B. F. Ashe
Deland	John B. Stetson University	Wm. Sims Allen
Gainesville ...	University of Florida	John J. Tigert
Lakeland	Southern College	Ludd M. Spivey
St. Leo	St. Leo College	Francis Sadlier
Tallahassee ...	Florida Agricultural & Mechanical College	J. R. E. Lee
Tallahassee ...	Florida State College for Women	Edward Conradi
Winter Park ..	Rollins College	Hamilton Holt
Georgia		
Albany	Georgia Normal & Agricultural College	J. W. Holley
Americus	Georgia Southwestern College	Peyton Jacob
Athens	University of Georgia	S. V. Sanford
Atlanta	Atlanta-Southern Dental College	S. W. Foster
Atlanta	Atlanta University	John Hope
Atlanta	Clark University	M. S. Davage
Atlanta	Georgia School of Technology	Marion L. Brittain
Atlanta	Morehouse College	S. H. Archer
Atlanta	Morris Brown College	W. A. Fountain, Jr.
Atlanta	Spelman College	Florence M. Read
Augusta	Paine College	E. C. Peters
Bowdon	Bowdon College	Eldon Dittemore
Collegeboro ..	South Georgia Teachers College	M. S. Pittmon
Decatur	Agnes Scott College	James R. McCain
Demorest	Piedmont College	Henry C. Newell
Emory University	Emory University	Harvey W. Cox
Forsyth	Bessie Tift College	Aquila Chamlee
Gainesville	Brenau College	H. J. Pearce
LaGrange	La Grange College	W. E. Thompson
Macon	Mercer University	Spright Dowell
Macon	Wesleyan College	Dice R. Anderson
Milledgeville ..	Georgia State College for Women	Guy H. Wells
Mount Berry ..	Berry College	G. Leland Green
Oglethorpe University ..	Oglethorpe University	Thornwell Jacobs
Rome	Shorter College	Paul M. Cousins
Savannah	Georgia State Industrial College	B. F. Hubert
Valdosta	Georgia State Womans College	Jere M. Pound
Idaho		
Albion	Albion State Normal School	R. H. Snyder
Caldwell	The College of Idaho	Wm. Judson Boone
Lewiston	Lewiston State Normal School	J. E. Turner
Moscow	University of Idaho	M. G. Neale
Nampa	Northwest Nazarene College	R. E. Gilmore
Wesleyan	Gooding College	C. W. Tenney
Illinois		
Alton	Shurtleff College	P. L. Thompson
Aurora	Aurora College	Theodore Pierson Stephens
Bloomington ..	Illinois Wesleyan University	Harry Wright McPherson
Bourbonnais ..	St. Viator College	E. V. Cardinal
Carbondale ...	Southern Illinois State Normal University	H. W. Shryock
Carthage	Carthage College	I. W. Bingaman, Acting
Charleston	Eastern Illinois State Teachers College	Robert G. Buzzard
Chicago	Armour Institute of Technology	Willard E. Hotchkiss
Chicago	Chicago College of Osteopathy	Harry L. Collins
Chicago	Chicago Normal College	Butler Laughlin
Chicago	De Paul University	Francis V. Corcoran
Chicago	Lewis Institute	George N. Carman
Chicago	Loyola University	Samuel K. Wilson
Chicago	Pestalozzi Froebel Teachers College	Bertha H. Hegner
Chicago	St. Francis Xavier College for Women	Mother M. Sophia Mitchell
Chicago	The Chicago Theo. Seminary	Albert W. Palmer
Chicago	The University of Chicago	Robert M. Hutchins
Decatur	James Millikin University	John C. Hessler
De Kalb	Northern Illinois State Teachers College	Karl L. Adams
Elmhurst	Elmhurst College	Timothy Lehmann
Eureka	Eureka College	Clyde L. Lyon
Evanston	National College of Education	Edna Dean Baker
Evanston	Northwestern University	Walter Dill Scott
Galesburg	Knox College	Albert Britt
Greenville	Greenville College	Leslie R. Marston
Jacksonville ..	Illinois College	Harold C. Jaquith
Jacksonville ..	MacMurray College	C. P. McClelland
Joliet	College of St. Francis	Mother M. Thomasine
Lake Forest ..	Lake Forest College	H. McComb Moore
Lebanon	McKendree College	Cameron Harmon
Lisle	St. Procopius College	Valentine Kohlbeck
Macomb	Western Illinois State Teachers College	W. P. Morgan
Monmouth	Monmouth College	Thos. H. McMichael
Mundelein	St. Mary of the Lake Seminary	J. G. Kealy
Naperville	North Central College	Edward E. Rall
Normal	Illinois State Normal University	R. W. Fairchild
Peoria	Bradley Polytechnic Institute	F. R. Hamilton
Peru	St. Bede College	Justus Witth
Quincy	Quincy College	V. A. Fochtman
River Forest ..	Rosary College	Sister Thomas Aquinas
Rockford	Rockford College	Gordon Keith Chalmers
Rock Island ...	Augustana College	G. A. Andreen
Urbana	University of Illinois	A. C. Willard
Wheaton	Wheaton College	J. O. Buswell, Jr.
Indiana		
Bloomington ..	Indiana University	William L. Bryan
Crawfordsville .	Wabash College	Louis B. Hopkins
Danville	Central Normal College	Waldo E. Wood
Evansville	Evansville College	Earl E. Harper
Franklin	Franklin College	Wm. Gear Spencer
Goshen	Goshen College	Sanford C. Yoder
Greencastle ...	DePauw University	G. Bromley Oxnam
Hanover	Hanover College	A. G. Parker, Jr.
Huntington ...	Huntington College	Harold C. Mason
Indianapolis ..	Butler University	James William Putnam, Acting
Indianapolis ..	Indiana Central College	I. J. Good
Indianapolis ..	Indianapolis College of Pharmacy	Edward H. Niles
Indianapolis ..	Normal College of the American Gymnastic Union	Carl B. Sputh
Lafayette	Purdue University	Edward C. Elliott
Marion	Marion College	Wm. F. McConn
Muncie	Ball State Teachers College	L. A. Pittenger
N. Manchester.	Manchester College	Otho Winger
Notre Dame ..	St. Marys College	Sister M. Madeleva
Notre Dame ..	University of Notre Dame	John F. O'Hara
Oakland City .	Oakland City College	W. P. Dearing
Richmond	Earlham College	William C. Dennis
St. Mary of the Woods	St. Mary of the Woods College	Mother Mary Raphael
Terre Haute ..	Indiana State Teachers College	Ralph N. Tirey
Terre Haute ..	Rose Polytechnic Institute	Donald B. Prentice
Upland	Taylor University	Robert Lee Stuart
Valparaiso	Valparaiso University	O. C. Kreinheder
Iowa		
Ames	Iowa State College of Agriculture and Mechanic Arts	R. M. Hughes
Cedar Falls ...	Iowa State Teachers College	O. R. Latham
Cedar Rapids .	Coe College	Harry M. Gage
Clinton	Wartburg College	Otto L. Proehl
Davenport	St. Ambrose College	Martin Cone
Decorah	Luther College	O. J. H. Preus
Des Moines ...	Des Moines College of Pharmacy	Carl Weeks
Des Moines ...	Des Moines Still College of Osteopathy	C. W. Johnson
Des Moines ...	Drake University	D. W. Morehouse
Dubuque	Clarke College	Sister Mary Agatha
Dubuque	Columbia College	Thomas Conry
Dubuque	University of Dubuque	Paul H. Buchholz
Fairfield	Parsons College	Clarence W. Greene
Fayette	Upper Iowa University	Arthur E. Bennett
Grinnell	Grinnell College	John S. Nollen
Indianola	Simpson College	John L. Hillman
Iowa City	State University of Iowa	Eugene A. Gilmore
Le Mars	Western Union College	D. O. Kime
Mount Pleasant	Iowa Wesleyan College	James E. Coons
Mount Vernon.	Cornell College	H. J. Burgstahler
Oskaloosa	William Penn College	B. F. Andrews
Pella	Central College	Irwin J. Lubbers
Sioux City ...	Morningside College	Robert E. O'Brian
Sioux City ...	Trinity College	John A. Elbert
Storm Lake ...	Buena Vista College	Henry Olson
University Park	John Fletcher College	John Paul
Kansas		
Atchison	St. Benedict's College	Martin Veth
Baldwin City..	Baker University	Wallace B. Fleming

City	Institution	President
Emporia	College of Emporia	John Bailey Kelly
Emporia	Kansas State Teachers College	Thomas W. Butcher
Hays	Fort Hays Kansas State College	C. E. Rarick, Acting
Lawrence	University of Kansas	E. H. Lindley
Lindsborg	Bethany College	Ernst F. Pihlblad
McPherson	McPherson College	V. F. Schwalm
Manhattan	Kansas State College of Agriculture and Applied Science	Francis D. Farrell
Newton	Bethel College	Ed. G. Kaufman
Ottawa	Ottawa University	W. P. Behan, Acting
Pittsburg	Kansas State Teachers College	W. A. Brandenburg
St. Marys	St. Mary's College	M. Germing
Salina	Kansas Wesleyan University	Larkin B. Bowers
Salina	Marymount College	Mother Mary Rose
Sterling	Sterling College	H. A. Kelsey
Topeka	Washburn College	Philip C. King
Wichita	Friends University	David M. Edwards
Wichita	Municipal University of Wichita	William M. Jardine
Winfield	Southwestern College	Frank E. Mossman
Kentucky		
Barbourville	Union College	John Owen Gross
Berea	Berea College	Wm. J. Hutchins
Bowling Green	Western Kentucky State Teachers College	H. H. Cherry
Danville	Centre College	Charles J. Turck
Frankfort	Kentucky State Industrial College	R. B. Atwood
Georgetown	Georgetown College	Henry Noble Sherwood
Lexington	Transylvania College	Arthur Braden
Lexington	University of Kentucky	Frank L. McVey
Louisville	Louisville College of Pharmacy	Rudolph V. Miersch
Louisville	Louisville Municipal College	Raymond A. Kent
Louisville	Louisville Normal School	E. Breckinridge *
Louisville	Southern Baptist Theological Seminary	John R. Sampey
Louisville	University of Louisville	Raymond A. Kent
Morehead	Morehead State Teachers College	J. Howard Payne
Murray	State Teachers College	John W. Carr
Richmond	Eastern Kentucky State Teachers College	H. L. Donovan
Wilmore	Asbury College	H. C. Morrison
Winchester	Kentucky Wesleyan College	R. V. Bennett
Louisiana		
Baton Rouge	Louisiana State University and Agricultural & Mechanical College	James M. Smith
Baton Rouge	Southern University	J. S. Clark
Lafayette	Southwestern Louisiana Institute	Edwin L. Stephens
Natchitoches	Louisiana State Normal College	A. A. Fredericks
New Orleans	Dillard University	W. W. Alexander, Acting
New Orleans	Loyola University	John W. Hynes
New Orleans	Newcomb Memorial College	Pierce Butler
New Orleans	New Orleans University	O. E. Kriege
New Orleans	Straight College	Charles B. Austin
New Orleans	Tulane University of Louisiana	A. B. Dinwiddie
New Orleans	Xavier University	Mother M. Agatha
Pineville	Louisiana College	Claybrook Cottingham
Ruston	Louisiana Polytechnic Institute	G. W. Bond
Shreveport	Centenary College of Louisiana	Pierce Cline
Maine		
Brunswick	Bowdoin College	Kenneth C. M. Sills
Castine	Eastern State Normal School	William D. Hall
Farmington	State Normal School	Wilbert G. Mallett
Fort Kent	Madawaska Training School	Richard F. Crocker*
Gorham	State Normal School	Walter E. Russell
Lewiston	Bates College	Clifton D. Gray
Machias	Washington State Normal School	Philip H. Kimball*
Orono	University of Maine	Arthur A. Hauck
Presque Isle	Aroostock State Normal School	San L. Merriman
Waterville	Colby College	Frank W. Johnson
Maryland		
Annapolis	St. John's College	A. W. W. Woodcock
Annapolis	United States Naval Academy	David F. Sellers, Supt.
Baltimore	Goucher College	David A. Robertson
Baltimore	Johns Hopkins University	Joseph S. Ames
Baltimore	Loyola College	J. A. Canning
Baltimore	Milton University	Wm. Jas. Heaps
Baltimore	Morgan College	John O. Spencer
Baltimore	Notre Dame College	Sister M. Ethelbert
Baltimore	St. Mary's Seminary & University	John F. Fenlon
Bowie	Maryland Normal School	L. S. James
Chestertown	Washington College	Gilbert W. Mead
College Park	University of Maryland	R. A. Pearson
Emmitsburg	Mount St. Mary's College	Bernard J. Bradley
Emmitsburg	St. Joseph's College	Sister Paula
Frederick	Hood College	Henry I. Stahr
Frostburg	State Normal School	John L. Dunkle *
Lutherville	Maryland College for Women	Frederick E. Metzger
Salisbury	Maryland State Normal School	J. T. Caruthers, Acting
Towson	Maryland State Normal School	Lida Lee Tall
Westminster	Western Maryland College	Albert N. Ward
Massachusetts		
Amherst	Amherst College	Stanley King
Amherst	Massachusetts State College	Hugh P. Baker
Boston	Boston University	Daniel L. Marsh
Boston	Emmanuel College	Sister Agnes Cecilia
Boston	Massachusetts College of Pharmacy	Theodore J. Bradley
Boston	Northeastern University	Frank P. Speare
Boston	Simmons College	Bancroft Beatley
Boston	Teachers College of the City of Boston	Wm. H. J. Kennedy
Bridgewater	State Teachers College	Zenos E. Scott
Cambridge	Harvard University	James B. Conant
Cambridge	Massachusetts Institute of Technology	Karl T. Compton
Cambridge	Radcliffe College	Ada L. Comstock
Chestnut Hill	Boston College	L. J. Gallagher
Fitchburg	State Teachers College	Charles M. Herlihy
Framingham	State Teachers College	Francis A. Bagnall
Hyannis	State Teachers College	Herbert H. Howes
Lowell	Lowell Textile Institute	Charles H. Eames
Lowell	State Teachers College	Clarence M. Weed
Newton Center	Andover Newton Theological School	Everett C. Herrick
North Adams	State Teachers College	Albert G. Eldridge
Northampton	Smith College	William A. Neilson
Norton	Wheaton College	John Edgar Park
Salem	State Teachers College	J. Asbury Pitman
South Hadley	Mount Holyoke College	Mary E. Woolley
Springfield	American International College	C. S. McGown
Springfield	International Y. M. C. A. College	L. L. Doggett
Tufts College	Tufts College	John A. Cousens
Wellesley	Wellesley College	Ellen F. Pendleton
Westfield	State Teachers College	Charles Russell
Williamstown	Williams College	Tyler Dennett
Worcester	Clark University	Wallace W. Atwood
Worcester	Holy Cross College	Francis J. Dolan
Worcester	State Teachers College	Wm. B. Aspinwall
Worcester	Worcester Polytechnic Institute	Ralph Earle
Michigan		
Adrian	Adrian College	Harlan L. Feeman
Albion	Albion College	John L. Seaton
Alma	Alma College	Harry M. Crooks
Ann Arbor	University of Michigan	Alex. G. Ruthven
Battle Creek	Battle Creek College	Emil Leffler
Berrien Spgs	Emmanuel Missionary College	Thomas W. Steen
Detroit	Detroit College of Law	Charles B. Van Duesen
Detroit	Detroit Institute of Technology	Paul Hickey
Detroit	Marygrove College	George H. Derry
Detroit	University of Detroit	A. H. Poetker
Detroit	Wayne University	Frank Cody
East Lansing	Michigan State College of Agriculture and Applied Science	Robert S. Shaw
Grand Rapids	Calvin College	Ralph Stob
Hillsdale	Hillsdale College	Willfred Mauck
Holland	Hope College	Wynand Wichers
Houghton	Michigan College of Mining and Technology	Wm. O. Hotchkiss
Kalamazoo	Kalamazoo College	Allan Hoben
Kalamazoo	Western State Teachers College	D. B. Waldo
Marquette	Northern State Teachers College	Webster H. Pearce
Mt. Pleasant	Central State Teachers College	E. C. Warriner
Olivet	Olivet College	Joseph Brewer
Ypsilanti	Michigan State Normal College	J. M. Munson
Minnesota		
Bemidji	State Teachers College	M. W. Deputy
Collegeville	St. John's University	Alcuin Deutsch
Duluth	College of St. Scholastica	Mother M. Agnes Somers

City	Institution	President
Duluth	State Teachers College	E. W. Bohannon
Mankato	State Teachers College	Frank D. McElroy
Minneapolis	Augsburg College	George Sverdrup
Minneapolis	University of Minnesota	Lotus D. Coffman
Moorhead	Concordia College	J. N. Brown
Moorhead	State Teachers College	R. B. MacLean
New Ulm	Dr. Martin Luther College	C. L. Schweppe, Acting
Northfield	Carleton College	Donald J. Cowling
Northfield	St. Olaf College	L. W. Boe
St. Cloud	State Teachers College	George A. Selke
St. Paul	Bethel Institute	G. A. Hagstrom
St. Paul	College of St. Catherine	Sister Antonia
St. Paul	College of St. Thomas	James H. Moynihan
St. Paul	Hamline University	Charles N. Pace
St. Paul	Macalester College	John C. Acheson
St. Peter	Gustavus Adolphus College	O. J. Johnson
Winona	College of St. Teresa	Sister Mary A. Molloy
Winona	St. Mary's College	Brother Leopold
Winona	State Teachers College	Guy E. Maxwell
Mississippi		
Alcorn	Agricultural & Mechanical College	Wm. H. Bell
Blue Mountain	Blue Mountain College	Lawrence T. Lowrey
Cleveland	Delta State Teachers College	W. M. Kethley
Clinton	Mississippi College	D. M. Nelson
Columbus	Mississippi State College for Women	B. L. Parkinson
Hattiesburg	Mississippi Woman's College	W. E. Holcomb
Hattiesburg	State Teachers College	J. B. George
Holly Springs	Rust College	L. M. McCoy
Jackson	Belhaven College	G. T. Gillespie
Jackson	Jackson College	B. Baldwin Dansby
Jackson	Millsaps College	D. M. Key
State College	Mississippi State College	G. D. Humphrey
Tougaloo	Tougaloo College	Chas. B. Austin
University	University of Mississippi	Alfred Hume
Missouri		
Canton	Culver Stockton College	John H. Wood
Cape Girardeau	Southeast Missouri State Teachers College	Walter W. Parker
Columbia	University of Missouri	F. A. Middlebush
Fayette	Central College	Robert H. Ruff
Fulton	Westminster College	F. L. McCluer
Jefferson City	Lincoln University	C. W. Florence
Kansas City	Kansas City College of Osteopathy & Surgery	Geo. J. Conley
Kansas City	Kansas City-Western Dental College	R. J. Rinehart, Dean
Kansas City	Rockhurst College	Daniel H. Conway
Kansas City	Teachers College of Kansas City	G. W. Diemer
Kirksville	Kirksville College of Osteopathy & Surgery	Geo. M. Laughlin
Kirksville	Northeast Missouri State Teachers College	Eugene Fair
Liberty	William Jewell College	John F. Herget
Marshall	Missouri Valley College	George H. Mack
Maryville	Northwest Missouri State Teachers College	Uel W. Lamkin
Parkville	Park College	F. W. Hawley
St. Charles	Lindenwood College	John L. Roemer
St. Louis	Concordia Theological Seminary	L. Fuerbringer
St. Louis	Harris Teachers College	C. G. Vannest
St. Louis	Maryville College	Mother Mary Reid
St. Louis	St. Louis College of Pharmacy	W. H. Harper
St. Louis	St. Louis University	Robert S. Johnston
St. Louis	Stowe Teachers College	Ruth M. Harris, Chmn. Temporary Committee
St. Louis	Washington University	George R. Throop
Springfield	Drury College	T. W. Nadal
Springfield	Southwest Missouri State Teachers College	Roy Ellis
Tarkio	Tarkio College	M. E. Collins
Warrensburg	Central Missouri State Teachers College	E. L. Hendricks
Webster Groves	Webster College	George F. Donovan
Montana		
Billings	Eastern Montana Normal School, University of Montana	L. B. McMullen
Bozeman	Montana State College of Agriculture & Mechanic Arts	Alfred Atkinson
Butte	Montana School of Mines	Francis A. Thomson
Dillon	Montana State Normal College	Sheldon E. Davis
Helena	Carroll College	Emmet Riley
Helena	Intermountain Union College	Jesse W. Bunch
Missoula	State University of Montana	Charles H. Clapp
Polytechnic	Billings Polytechnic Institute	Ernest T. Eaton
Nebraska		
Blair	Dana College	Erland Nelson
Central City	Nebraska Central College	O. W. Carrell
Chadron	Nebraska State Normal College	Robert I. Elliott
Crete	Doane College	Edwin B. Dean
Fremont	Midland College and Western Theological Seminary	H. F. Martin
Hastings	Hastings College	J. W. Creighton
Kearney	Nebraska State Teachers College	George E. Martin
Lincoln	Nebraska Wesleyan University	E. Guy Cutshall
Lincoln	Union College	M. L. Andreasen
Lincoln	University of Nebraska	E. A. Burnett, Chancellor
Omaha	Creighton University	Patrick J. Mahan
Omaha	Municipal University of Omaha	Wm. E. Sealock
Peru	Peru State Teachers College	W. R. Pate
Seward	Concordia Teachers College	C. F. Brommer
Wayne	Nebraska State Teachers College	U. S. Conn
York	York College	J. R. Overmiller
Nevada		
Reno	University of Nevada	Walter E. Clark
New Hampshire		
Durham	University of New Hampshire	Edward M. Lewis
Hanover	Dartmouth College	Ernest M. Hopkins
Keene	Keene Normal School	Wallace E. Mason
Manchester	St. Anselm's College	Bertrand C. Dolan
Plymouth	Plymouth Normal School	Ernest L. Silver
New Jersey		
Convent Station	College of St. Elizabeth	Sister Marie Jose Byrne, Dean
East Orange	Panzer College of Physical Education and Hygiene	Margaret C. Brown
East Orange	Upsala College	Carl G. Erickson
Glassboro	New Jersey State College	J. J. Savitz
Hoboken	Stevens Institute of Technology	Harvey N. Davis
Jersey City	St. Peter's College	Joseph S. Dinneen
Jersey City	State Normal School at Jersey City	Roy L. Shaffer
Lakewood	Georgian Court College	Mother M. Cecelia Scully
Madison	Drew University	Arlo Ayres Brown
Montclair	New Jersey State Teachers College	Harry A. Sprague
Newark	Newark College of Engineering	Allan R. Cullimore
Newark	New Jersey State Normal School	M. Ernest Townsend
New Brunswick	New Jersey State College for Women	Margaret T. Corwin, Dean
New Brunswick	Rutgers University	Robert C. Clothier
Paterson	New Jersey State Normal School	Edgar F. Bunce, Acting
Princeton	Princeton Theological Seminary	James Ross Stevenson
Princeton	Princeton University	Harold W. Dodds
Princeton	St. Joseph's College	Anthony Kieffer
South Orange	Seton Hall College	Frank J. Monaghan
Trenton	State Teachers College & Normal School	Roscoe L. West
New Mexico		
Albuquerque	University of New Mexico	J. F. Zimmerman
El Rito	Spanish-American Normal School	John V. Conway
Las Vegas	New Mexico Normal University	H. C. Gossard
Silver City	New Mexico State Teachers College	Hoyt C. Graham
Socorro	New Mexico School of Mines	E. H. Wells
State College	New Mexico College of Agriculture & Mechanic Arts	H. L. Kent
New York		
Albany	College of St. Rose	Edmund F. Gibbons
Albany	State College for Teachers	A. R. Brubacher
Alfred	Alfred University	J. Nelson Norwood
Annandale-on-Hudson	Bard College, Columbia University	Donald G. Tewksbury, Act. Dean
Auburn	Auburn Theological Seminary	Harry Lathrop Reed
Aurora	Wells College	Kerr D. Macmillan
Barrytown	St. Joseph's Normal Institute	Brother A. Bernard
Brockport	State Normal School	Alfred C. Thompson
Brooklyn	Brooklyn College	William A. Boylan
Brooklyn	Long Island University	Tristram W. Metcalfe, Dean
Brooklyn	Polytechnic Institute of Brooklyn	Harry J. Rogers
Brooklyn	Saint Francis College	Brother Capistran

City	Institution	President
Brooklyn	St. John's University	Thomas F. Ryan
Brooklyn	St. Joseph's College for Women	Thomas E. Molloy
Buffalo	Canisius College	James P. Sweeney
Buffalo	D'Youville College	Sister Grace of the Sacred Heart
Buffalo	State Teachers College	Harry W. Rockwell
Buffalo	The University of Buffalo	Samuel Paul Capen
Canton	St. Lawrence University	Richard E. Sykes
Clinton	Hamilton College	Frederick C. Ferry
Cortland	State Normal School	H. DeW. DeGroat *
Elmira	Elmira College	Frederick Lent
Fredonia	State Normal School	L. R. Gregory *
Garden City	Adelphi College	Frank D. Blodgett
Geneseo	State Normal School	James B. Welles
Geneva	Hobart College	Murray Bartlett
Hamilton	Colgate University	George B. Cutten
Houghton	Houghton College	James S. Luckey
Ithaca	Cornell University	Livingston Farrand
Ithaca	Ithaca College	Leonard Bliss Job
Keuka Park	Keuka College	A. H. Norton
New Paltz	State Normal School	L. H. van den Berg
New Rochelle	College of New Rochelle	John P. Chidwick
New York	Barnard College	Virginia C. Gildersleeve, Dean
New York	Biblical Seminary in New York	Wilbert W. White
New York	College of the City of New York	F. B. Robinson
New York	College of Mount St. Vincent	Cardinal Hayes
New York	College of The Sacred Heart	Mother Grace C. Dammann
New York	Columbia University	Nicholas M. Butler
New York	Cooper Union	.....
New York	Fordham University	Aloysius J. Hogan
New York	General Theological Seminary	H. Fosbroke
New York	Hunter College of the City of N. Y.	Eugene A. Colligan
New York	Jewish Theological Seminary of America	Cyrus Adler
New York	Manhattan College	Brother Patrick
New York	New York Homeopathic Medical College	Claude A. Burrett, Dean
New York	New York University	Harry W. Chase, Chancellor
New York	Savage School for Physical Education	Ella W. Savage
New York	Teachers College, Columbia University	Wm. F. Russell, Dean
New York	Union Theological Seminary	Henry S. Coffin
Niagara Univ.	Niagara University	Joseph M. Noonan
Oneonta	Hartwick College	Chas. W. Leitzell
Oneonta	State Normal School	Chas. W. Hunt *
Oswego	State Normal School	Ralph W. Swetman *
Plattsburg	State Normal School	Charles C. Ward
Potsdam	Clarkson College of Technology	James Shelby Thomas
Potsdam	State Normal School	R. T. Congdon *
Poughkeepsie	Vassar College	H. N. MacCracken
Rochester	Nazareth College	Sister Teresa Marie, Dean
Rochester	The Colgate-Rochester Divinity School	Albert W. Beaven
Rochester	University of Rochester	Rush Rhees
St. Bonaventure	St. Bonaventure's College	Thomas Plassmann
Saratoga Spgs.	Skidmore College	Henry T. Moore
Schenectady	Union College	Dixon Ryan Fox
Staten Island	Wagner Memorial Lutheran College	Frederic Sutter, Acting
Syracuse	New York State College of Forestry	Samuel N. Spring, Dean
Syracuse	Syracuse City Normal School	Wm. W. Wright *
Syracuse	Syracuse University	C. Wesley Flint *
Tarrytown	Marymount College	Mother M. Gerard
Troy	Rensselaer Polytechnic Institute	Palmer C. Ricketts
Troy	Russell Sage College	J. L. Meader
West Point	United States Military Academy	W. D. Connor, Supt.
White Plains	Good Counsel College	Mother M. Aloysia
North Carolina		
Asheville	Asheville Normal & Teachers College	John E. Calfee
Boone	Appalachian State Teachers College	B. B. Dougherty
Chapel Hill	University of North Carolina	Frank P. Graham
Charlotte	Johnson C. Smith University	H. L. McCrorey
Charlotte	Queens Chicora College	W. H. Frazer
Conover	Concordia College	H. B. Hemmeter
Cullowhee	Western Carolina Teachers College	H. T. Hunter
Davidson	Davidson College	Walter L. Lingle
Durham	Duke University	Wm. Preston Few
Durham	North Carolina College for Negroes	James E. Shepard
Elizabeth City	State Normal School	J. H. Bias
Elon College	Elon College	Leon E. Smith
Fayetteville	State Normal School	J. W. Seabrook
Greensboro	Agricultural & Technical College	F. D. Bluford
Greensboro	Bennett College	David D. Jones
Greensboro	Greensboro College	S. B. Turrentine
Greensboro	The Woman's College of the University of N. C.	W. C. Jackson, Dean
Greenville	East Carolina Teachers College	Leon R. Meadows
Guilford College	Guilford College	Clyde A. Milner
Hickory	Lenoir Rhyne College	P. E. Monroe
High Point	High Point College	G. I. Humphreys
Kittrell	Kittrell College	Chas. E. Stewart
Murfreesboro	Chowan College	W. B. Edwards
Raleigh	Meredith College	Charles E. Brewer
Raleigh	North Carolina State College of Agriculture & Engineering, University of North Carolina	John W. Harrelson, Dean
Raleigh	St. Augustine's College	Edgar H. Goold
Raleigh	Shaw University	Wm. Stuart Nelson
Red Springs	Flora MacDonald College	Henry G. Bedinger
Salisbury	Catawba College	Howard R. Omwake
Salisbury	Livingstone College	W. J. Trent
Wake Forest	Wake Forest College	Thurman D. Kitchin
Wilson	Atlantic Christian College	H. S. Hilley
Winston-Salem	Salem College	H. E. Rondthaler
Winston-Salem	Winston-Salem Teachers College	F. L. Atkins
North Dakota		
Dickinson	State Normal School	C. L. Kjerstad
Ellendale	State Normal & Industrial School	R. M. Black
Fargo	North Dakota Agricultural College	John H. Sheppard
Grand Forks	Wesley College	Charles L. Wallace
Jamestown	Jamestown College	B. H. Kroeze
Mayville	State Teachers College	Carl C. Swain
Minot	State Teachers College	G. A. McFarland
University	University of North Dakota	John C. West
Valley City	State Teachers College	C. E. Allen
Ohio		
Ada	Ohio Northern University	Robert Williams
Akron	University of Akron	H. E. Simmons
Alliance	Mount Union College	Wm. H. McMaster
Ashland	Ashland College	Edwin E. Jacobs
Athens	Ohio University	Edwin Watts Chubb, Acting
Berea	Baldwin-Wallace College	Louis Clinton Wright
Bluffton	Bluffton College	Samuel K. Mosiman
Bowling Green	Bowling Green State College	H. B. Williams
Cedarville	Cedarville College	W. R. McChesney
Cincinnati	University of Cincinnati	Raymond Walters
Cincinnati	Xavier University	Hugo F. Sloctemyer
Cleveland	John Carroll University	B. J. Rodman
Cleveland	Case School of Applied Science	Wm. E. Wickenden
Cleveland	Ursuline College	Mother M. Veronica Nash
Cleveland	Western Reserve University	W. G. Leutner
Columbus	Capital University	Otto Mees
Columbus	Ohio State University	G. W. Rightmire
Dayton	University of Dayton	Walter C. Tredtin
Defiance	Defiance College	F. W. Raymond
Delaware	Ohio Wesleyan University	Edmund D. Soper
East Columbus	St. Mary's of the Spring College	Sister Bernardine
Findlay	Findlay College	H. R. Dunathan
Gambier	Kenyon College	Wm. F. Peirce
Granville	Denison University	A. A. Shaw
Hiram	Hiram College	Kenneth I. Brown
Kent	Kent State College	J. O. Engleman
Marietta	Marietta College	Edward S. Parsons
Mount St. Joseph	Mount St. Joseph College	Mother Mary Regina
New Concord	Muskingum College	R. N. Montgomery
Oberlin	Oberlin College	Ernest H. Wilkins
Oxford	Miami University	Alfred H. Upham
Oxford	Western College	Ralph K. Hickok
Painesville	Lake Erie College	Vivian B. Small

City	Institution	President
South Euclid	Notre Dame College	Mother Mary Evarista
Springfield	Wittenberg College	Rees Edgar Tulloss
Tiffin	Heidelberg College	Charles E. Miller
Toledo	St. John's University	G. A. Fitzgibbons
Toledo	Toledo Teachers College	Karl J. Alter
Toledo	University of Toledo	Philip Curtis Nash
Westerville	Otterbein College	W. G. Clippinger
Wilberforce	Wilberforce University	R. R. Wright, Jr.
Wilmington	Wilmington College	Walter L. Collins
Wooster	The College of Wooster	Charles F. Wishart
Yellow Springs	Antioch College	Arthur E. Morgan
Oklahoma		
Ada	East Central State Teachers College	A. Linscheid
Alva	Northwestern State Teachers College	O. E. Hatcher
Bethany	Bethany-Peniel College	A. K. Bracken
Chickasha	Oklahoma College for Women	M. A. Nash
Durant	Southeastern Teachers College	Wade H. Shumate
Edmond	Central State Teachers College	M. A. Beeson
Enid	Phillips University	I. N. McCash
Goodwell	Panhandle Agricultural & Mechanical College	J. Byron Dacus
Guthrie	Catholic College of Oklahoma for Women	Mother Mary Agnes Arvin
Langston	Colored Agricultural & Normal University	I. W. Young
Norman	University of Oklahoma	Wm. B. Bizzell
Oklahoma City	Oklahoma City University	W. S. Athearn
Shawnee	Oklahoma Baptist University	John W. Raley
Stillwater	Oklahoma Agricultural & Mechanical College	Henry G. Bennett
Tahlequah	Northeastern State Teachers College	M. P. Hammond
Tulsa	University of Tulsa	R. L. Langenheim
Weatherford	Southwestern State Teachers College	C. W. Richards
Oregon		
Albany	Albany College	Thomas W. Bibb
Ashland	Southern Oregon State Normal School	Walter Redford
Corvallis	Oregon State College	George W. Peavy
Eugene	University of Oregon	Clarence V. Boyer
Forest Grove	Pacific University	John F. Dobbs
La Grande	Eastern Oregon Normal School	H. E. Inlow
McMinnville	Linfield College	Elam J. Anderson
Monmouth	Oregon Normal School	J. A. Churchill
Newberg	Pacific College	Levi T. Pennington
Oswego	Marylhurst College	Sister Mary Joan
Portland	North Pacific College	Herbert C. Miller
Portland	Reed College	Dexter M. Keezer
Salem	Willamette University	Bruce R. Baxter
Pennsylvania		
Allentown	Cedar Crest College	Wm. F. Curtis
Allentown	Muhlenberg College	John A. W. Haas
Annville	Lebanon Valley College	Clyde A. Lynch
Beaver Falls	Geneva College	M. M. Pearce
Bethlehem	Lehigh University	Chas. R. Richards
Bethlehem	Moravian College and Theo. Seminary	Wm. N. Schwarze
Bethlehem	Moravian College for Women	Edwin J. Heath
Bloomsburg	State Teachers College	Francis B. Haas
Bryn Athyn	Academy of the New Church	N. D. Pendleton
Bryn Mawr	Bryn Mawr College	Marion E. Park
California	State Teachers College	Robert M. Steele
Carlisle	Dickinson College	Fred P. Corson
Chambersburg	Wilson College	E. D. Warfield
Chester	Crozier Theological Seminary	James H. Franklin
Chester	Pennsylvania Military College	Frank K. Hyatt
Chestnut Hill	Mount St. Joseph College	Mother Mary James
Cheyney	State Teachers College	L. P. Hill
Clarion	State Teachers College	G. C. L. Riemer
Collegeville	Ursinus College	George L. Omwake
Dallas	College Misericordia	Sister Mary Loretta
Easton	Lafayette College	Wm. Mather Lewis
East Stroudsburg	State Teachers College	T. T. Allen
Edinboro	State Teachers College	Carmon A. Ross
Elizabethtown	Elizabethtown College	Ralph W. Schlosser
Erie	Mercyhurst College	Sister M. Xavier O'Neil
Gettysburg	Gettysburg College	H. W. A. Hanson
Greensburg	Seton Hill College	J. A. W. Reeves
Greenville	Thiel College	Earl S. Rudisill
Grove City	Grove City College	Weir C. Ketler
Haverford	Haverford College	W. W. Comfort
Huntingdon	Juniata College	Charles C. Ellis
Immaculata	Immaculata College	Anthony J. Flynn
Indiana	State Teachers College	C. R. Foster
Jenkintown	Beaver College	W. B. Greenway
Kutztown	State Teachers College	Quincy A. W. Rohrbach
Lancaster	Franklin & Marshall College	Henry H. Apple
Latrobe	St. Vincent College	Alfred Koch
Lewisburg	Bucknell University	Homer P. Rainey
Lincoln Univ.	Lincoln University	Wm. H. Johnson
Lock Haven	State Teachers College	D. W. Armstrong
Loretto	St. Francis College	P. J. Sullivan
Mansfield	State Teachers College	W. R. Straughn
Meadville	Allegheny College	Wm. P. Tolley
Millersville	State Teachers College	Landis Tanger
New Wilmington	Westminster College	Robert F. Galbreath
Philadelphia	Drexel Institute	Parke R. Kolbe
Philadelphia	Dropsie College	Cyrus Adler
Philadelphia	Hahnemann Medical College of Philadelphia	W. A. Pearson
Philadelphia	La Salle College	Brother E. Anselm
Philadelphia	Philadelphia College of Osteopathy	Edgar O. Holden
Philadelphia	Philadelphia College of Pharmacy & Science	Wilmer Krusen
Philadelphia	St. Joseph's College	Thomas J. Higgins
Philadelphia	Temple University	Charles E. Beury
Philadelphia	University of Pennsylvania	Thomas S. Gates
Philadelphia	Women's Medical College of Pennsylvania	Mrs. James Starr
Pittsburgh	Carnegie Institute of Technology	Thomas S. Baker
Pittsburgh	Duquesne University	J. J. Callahan
Pittsburgh	H. C. Frick Training School for Teachers	Dana Z. Eckert *
Pittsburgh	Pennsylvania College for Women	Helen Marks, Acting
Pittsburgh	University of Pittsburgh	John G. Bowman, Chancellor
Reading	Albright College	J. Warren Klein
Rosemont	Rosemont College	Mother Mary Ignatius
Scranton	Marywood College	Mother M. Josepha
Scranton	St. Thomas College	Brother D. Edward
Selinsgrove	Susquehanna University	G. Morris Smith
Shippensburg	State Teachers College	A. L. Rowland
Slippery Rock	State Teachers College	C. S. Miller
State College	Pennsylvania State College	Ralph D. Hetzel
Swarthmore	Swarthmore College	Frank Aydelotte
Villanova	Villanova College	E. V. Stanford
Washington	Washington & Jefferson College	Ralph Cooper Hutchison
Waynesburg	Waynesburg College	Paul R. Stewart
West Chester	State Teachers College	N. W. Cameron
Rhode Island		
Kingston	Rhode Island State College	Ray. G. Bressler
Providence	Brown University	C. A. Barbour
Providence	Rhode Island College of Education	John L. Alger
Providence	Rhode Island College of Pharmacy & Allied Sciences	W. Henry Rivard, Dean
South Carolina		
Charleston	The Citadel—The Military College of South Carolina	Chas. P. Summerall
Charleston	College of Charleston	Harrison Randolph
Charleston	Medical College of the State of South Carolina	Robert Wilson, Dean
Clemson College	Clemson Agricultural College	Enoch W. Sikes
Clinton	Presbyterian College	John McSween
Columbia	Allen University	Abram L. Simpson
Columbia	Benedict College	J. J. Starke
Columbia	Columbia College	J. Caldwell Guilds
Columbia	University of South Carolina	L. T. Baker
Due West	Erskine College	Robert C. Grier
Gaffney	Limestone College	R. C. Granberry
Greenville	Furman University	B. E. Geer
Greenville	Greenville Woman's College	B. E. Geer
Greenwood	Lander College	J. W. Speake
Hartsville	Coker College	Carlyle Campbell
Newberry	Newberry College	James C. Kinard
Orangeburg	Claflin College	J. B. Randolph
Orangeburg	State Agricultural and Mechanical College	M. F. Whittaker
Rock Hill	Winthrop College	Shelton Phelps
Spartanburg	Converse College	Edward M. Gwathmey
Spartanburg	Wofford College	Henry N. Snyder

City	Institution	President
South Dakota		
Aberdeen	Northern State Teachers College	Carl G. Lawrence
Brookings	South Dakota State College of Agriculture & Mechanic Arts	C. W. Pugsley
Huron	Huron College	Frank L. Eversull
Madison	Eastern State Normal School	V. A. Lowry
Mitchell	Dakota Wesleyan University	Earl A. Roadman
Rapid City	State School of Mines	C. C. O'Harra
Sioux Falls	Augustana College	Clemens M. Granskou
Sioux Falls	Sioux Falls College	C. R. Sattgast
Spearfish	Spearfish Normal School	E. C. Woodburn
Springfield	Southern State Normal School	Mrs. T. A. Harmon, Acting
Vermilion	University of South Dakota	Herman G. James
Yankton	Yankton College	G. W. Nash
Tennessee		
Bristol	King College	Robert Yost
Chattanooga	University of Chattanooga	Alexander Guerry
Clarksville	Austin Peay Normal School	P. P. Claxton
Cleveland	Bob Jones College	Robert R. Jones
Cookeville	Tennessee Polytechnic Institute	Q. M. Smith
Greenville	Tusculum College	C. A. Anderson
Harrogate	Lincoln Memorial University	S. W. McClelland
Jackson	Lambuth College	Richard E. Womack
Jackson	Lane College	J. F. Lane
Jackson	Union University	John J. Hurt
Jefferson City	Carson-Newman College	James T. Warren
Johnson City	State Teachers College	C. C. Sherrod
Knoxville	Knoxville College	J. Kelly Giffen
Knoxville	The University of Tennessee	James D. Hoskins
Lebanon	Cumberland University	Ernest L. Stockton
McKenzie	Bethel College	L. L. Thomas
Maryville	Maryville College	Ralph Waldo Lloyd
Memphis	Southwestern	Charles E. Diehl
Memphis	West Tennessee State Teachers College	J. W. Brister
Milligan College	Milligan College	H. J. Derthick
Murfreesboro	State Teachers College	P. A. Lyon
Murfreesboro	Tennessee College	E. L. Atwood
Nashville	Fisk University	Thomas E. Jones
Nashville	George Peabody College for Teachers	Bruce R. Payne
Nashville	Tennessee Agricultural & Industrial State Teachers College	W. J. Hale
Nashville	Vanderbilt University	James H. Kirkland
Sewanee	University of the South	Benj. F. Finney
Texas		
Abilene	Abilene Christian College	James F. Cox
Abilene	Hardin-Simmons University	J. D. Sandefer
Abilene	McMurry College	C. Q. Smith
Alpine	Sul Ross State Teachers College	H. W. Morelock
Austin	St. Edward's University	Joseph Maguire
Austin	Tillotson College	Mary E. Branch
Austin	The University of Texas	H. Y. Benedict
Belton	Baylor College for Women	J. C. Hardy
Brownwood	Daniel Baker College	Robert Guy Davis
Brownwood	Howard Payne College	Thomas H. Taylor
Canyon	West Texas State Teachers College	J. A. Hill
College Station	Texas Agricultural & Mechanical College	T. O. Walton
Commerce	East Texas State Teachers College	Sam H. Whitley
Dallas	Southern Methodist University	Chas. C. Selecman
Denton	North Texas State Teachers College	W. J. McConnell
Denton	Texas State College for Women	Louis H. Hubbard
El Paso	College of Mines	C. A. Puckett, Acting
Fort Worth	Texas Christian University	Edward McS. Waits
Fort Worth	Texas Woman's College	T. W. Brabham
Georgetown	Southwestern University	King Vivion
Houston	The Rice Institute	Edgar Odell Lovett
Huntsville	Sam Houston State Teachers College	H. F. Estill
Kingsville	Texas College of Arts & Industries	E. W. Seale
Lubbock	Texas Technological College	Bradford Knapp
Marshall	Bishop College	Joseph J. Rhoads
Marshall	Wiley College	M. W. Dogan
Nacogdoches	Stephen F. Austin State Teachers College	A. W. Birdwell
Prairie View	Prairie View State College	W. R. Banks *
San Antonio	Incarnate Word College	Sister M. Columkille
San Antonio	Our Lady of the Lake College	H. A. Constantineau
San Antonio	St. Mary's University	Alfred H. Rabe
San Marcos	Southwest Texas State Teachers College	C. E. Evans
Seguin	Guadalupe College	J. R. Lockett
Sherman	Austin College	Everett B. Tucker
Tyler	Texas College	D. R. Glass
Waco	Baylor University	Pat Neff
Waxahachie	Trinity University	Raymond H. Leach
Utah		
Logan	Utah State Agricultural College	Elmer G. Peterson
Provo	Brigham Young University	Franklin S. Harris
Salt Lake City	University of Utah	George Thomas
Vermont		
Bennington	Bennington College	Robert D. Leigh
Burlington	University of Vermont & State Agricultural College	Guy W. Bailey
Castleton	State Normal School	C. S. Woodruff *
Johnson	State Normal School	Ralph C. Jenkins
Middlebury	Middlebury College	Paul D. Moody
Northfield	Norwich University	Porter H. Adams
Winooski	St. Michael's College	L. E. Gosselin
Virginia		
Alexandria	Virginia Theological Seminary	W. E. Rollins
Ashland	Randolph Macon College	Rob't E. Blackwell
Blacksburg	Virginia Polytechnic Institute	Julian A. Burruss
Bridgewater	Bridgewater College	Paul H. Bowman
Charlotteville	University of Virginia	John Lloyd Newcomb
East Radford	State Teachers College	John P. McConnell
Emory	Emory & Henry College	J. N. Hillman
Farmville	State Teachers College	J. L. Jarman
Fredericksburg	State Teachers College	Morgan L. Combs
Hampden-Sydney	Hampden-Sydney College	J. D. Eggleston
Hampton	Hampton Institute	Arthur Howe
Harrisonburg	State Teachers College	S. P. Duke
Hollins	Hollins College	Bessie C. Randolph
Lawrenceville	St. Paul Normal & Industrial School	J. A. Russell
Lexington	Virginia Military Institute	J. A. Lejeune, Supt.
Lexington	Washington & Lee University	Francis P. Gaines
Lynchburg	Lynchburg College	J. T. T. Hundley
Lynchburg	Randolph-Macon Woman's College	Theo. Henley Jack
Lynchburg	Virginia Theological Seminary and College	S. A. Jordan, Acting
Petersburg	Virginia State College for Negroes	John M. Gandy
Richmond	Medical College of Virginia	William T. Sanger
Richmond	University of Richmond	F. W. Boatwright
Richmond	Virginia Union University	William J. Clark
Salem	Roanoke College	Chas. J. Smith
Staunton	Mary Baldwin College	L. Wilson Jarman
Sweet Briar	Sweet Briar College	Meta Glass
Williamsburg	College of William & Mary	John Stewart Bryan
Washington		
Bellingham	State Normal School	C. H. Fisher
Cheney	State Normal School	R. T. Hargreaves
College Place	Walla Walla College	Wm. M. Landeen
Ellensburg	Washington State Normal School	Rob't E. McConnell
Pullman	State College of Washington	Ernest O. Holland
Seattle	Seattle Pacific College	Charles H. Watson
Seattle	University of Washington	Lee Paul Sieg
Spokane	Gonzaga University	John J. Keep
Spokane	Whitworth College	Ward W. Sullivan
Tacoma	College of Puget Sound	Edward H. Todd
Walla Walla	Whitman College	Rudolf A. Clemen
West Virginia		
Athens	Concord State Teachers College	J. Frank Marsh
Barboursville	Morris Harvey College	Leonard Riggleman
Bethany	Bethany College	W. H. Cramblet
Bluefield	Bluefield State Teachers College	R. P. Sims
Buckhannon	West Virginia Wesleyan College	Roy McCuskey
Elkins	Davis & Elkins College	James E. Allen
Fairmont	Fairmont State Teachers College	Joseph Rosier
Glenville	Glenville State Teachers College	E. G. Rohrbough
Harpers Ferry	Storer College	H. T. McDonald
Huntington	Marshall College	M. P. Shawkey
Institute	West Virginia State College	John W. Davis

City	Institution	President
Morgantown ..	West Virginia University	John R. Turner
Salem	Salem College	S. Orestes Bond
Shepherdstown.	Shepherd State Teachers College	W. H. S. White
West Liberty .	West Liberty State Teachers College	John C. Shreve
Wisconsin		
Appleton	Lawrence College	Henry M. Wriston
Ashland	Northland College	J. D. Brownell
Beloit	Beloit College	Irving Maurer
Eau Claire ...	State Teachers College	H. A. Schofield
La Crosse	State Teachers College	Geo. M. Snodgrass
Madison	University of Wisconsin	Glenn Frank
Menomonie ...	The Stout Institute	Burton E. Nelson
Milton	Milton College	Jay W. Crofoot
Milwaukee ...	Marquette University	William M. Magee
Milwaukee ...	Milwaukee-Downer College	Lucia R. Briggs
Milwaukee ...	Mount Mary College	Edw. A. Fitzpatrick
Milwaukee ...	State Teachers College	Frank E. Baker
Nashotah	Nashotah House	E. J. M. Nutter
Oshkosh	State Teachers College	Forrest R. Polk
Platteville ...	State Teachers College	Asa M. Royce
Plymouth	Mission House College	Paul Grosshuesch
Ripon	Ripon College	Silas Evans
River Falls ...	State Teachers College	J. H. Ames
Stevens Point..	State Teachers College	Frank S. Hyer
Superior	State Teachers College	Jim Dan Hill
Watertown ...	Northwestern College	Erwin E. Kowalke
Waukesha	Carroll College	Wm. A. Ganfield
Whitewater ..	State Teachers College	C. M. Yoder
Wyoming		
Laramie	University of Wyoming	Arthur G. Crane
Outlying Possessions		
College		
Alaska	Alaska Agricultural College and School of Mines	Charles E. Bunnell
Honolulu, Hawaii	Teachers College, University of Hawaii	Benjamin O. Wist, Dean
Honolulu, Hawaii	University of Hawaii	David L. Crawford
Rio Piedras, Porto Rico ..	University of Puerto Rico	Carlos E. Chardon, Chancellor

City	Institution	President
Canada		
Antigonish, N. S.	St. Francis Xavier University	H. P. MacPherson
Aurora, Ont. ..	St. Andrew's College	D. B. Macdonald, Headmaster
Belleville, Ont.	Albert College	Bert Howard
Charlottetown P. E. I.	St. Dunstan's University	J. A. Murphy
Edmonton, Alta.	Alberta College	F. S. McCall *
Edmonton, Alta.	University of Alberta	R. C. Wallace
Fredericton, N. B.	University of New Brunswick	C. C. Jones
Halifax, N. S..	Dalhousie University	Carleton Stanley
Halifax, N. S..	Halifax Ladies College and Conservatory of Music	E. Florence Blackwood
Hamilton, Ont.	McMaster University	H. P. Whidden, Chancellor
Kingston, Ont.	Queen's University	W. H. Fyfe *
Kitchener, Ont.	St. Jerome's College	Robert S. Dehler
Lennoxville, Que.	University of Bishop's College	A. H. McGreer *
London, Ont. .	University of Western Ontario	Wm. Sherwood Fox
Montreal, Que.	Lower Canada College	C. S. Fosbery
Montreal, Que.	Loyola College	Thos. J. MacMahon
Montreal, Que.	McGill University	.....
Ottawa, Ont. .	University of Ottawa	G. Marchand
Ottawa, Ont. .	Ottawa University Normal School	Rene Lamoureux *
Quebec, Que. .	Laval University	Camille Roy
Regina, Sask. .	Regina College	E. W. Stapleford
St. Joseph, N. B.	St. Joseph's University	L. Lapalme
St. Thomas, Ont.	Alma College	P. S. Dobson *
Saskatoon, Sask.	University of Saskatchewan	W. C. Murray
Stanstead, Que.	Stanstead Wesleyan College	E. C. Amaron *
Toronto, Ont. .	University of Toronto	H. J. Cody
Toronto, Ont. .	Upper Canada College	W. L. Grant *
Toronto, Ont. .	Victoria University	E. W. Wallace
Truro, N. S. ..	Nova Scotia Agricultural College	J. M. Trueman *
Vancouver, B. C.	University of British Columbia	Leonard S. Klinck
Winnipeg, Man.	University of Manitoba	Sidney E. Smith
Winnipeg, Man.	Wesley College	John H. Riddell
Wolfville, N. S.	Arcadia University	F. W. Patterson

* Indicates normal school principals.

Section X

SUPERINTENDENTS OF SCHOOLS IN PLACES OF 5,000 POPULATION AND OVER

In the following list are included all places which are known to have a superintendent of schools and which, according to the 1930 Federal Census, have a population of 5,000 or over. These include incorporated cities, towns, boroughs and villages, unincorporated towns (in New England), and townships classified as urban by the Bureau of the Census. The names of the superintendents have been revised to November, 1934, and in some cases more recently.

REFERENCES

(a) County superintendent. (b) Parish superintendent.

City	Superintendent
Alabama	
Andalusia	C. L. Martin
Anniston	S. E. Alverson
Bessemer	J. E. Bryan
Birmingham	C. B. Glenn
Decatur	W. W. Benson
Dothan	C. C. Moseley
Eufaula	T. G. Wilkinson
Fairfield	B. B. Baker
Florence	J. W. Powell
Gadsden	C. A. Donehoo
Homewood	(No local board of education)
Huntsville	W. G. Hamm
Jasper	G. T. Patrick
Lanett	Taylor H. Kirby
Mobile	W. C. Griggs
Montgomery	W. R. Harrison
Opelika	R. B. Mardre
Phenix City	L. P. Stough
Selma	P. M. Munro
Sheffield	L. E. Creel
Talladega	Ben. S. Copeland
Tarrant	W. A. Parker
Troy	L. D. Bynum
Tuscaloosa	J. M. Burnett
Arizona	
Bisbee	R. E. Souers
Douglas	J. E. Carlson, Jr.
Globe	H. E. Stevenson
Miami	Ivan P. Hostetter
Nogales	A. J. Mitchell
Phoenix	John D. Loper
Prescott	Edward F. Honn
Tucson	C. E. Rose
Arkansas	
Blytheville	W. D. McClurkin
Camden	F. W. Whiteside
Conway	B. A. Short
El Dorado	J. G. McClerkin
Fayetteville	Frank S. Root
Fort Smith	J. W. Ramsey
Helena	J. F. Wahl
Hope	Miss Beryl Henry
Hot Springs National Park	Harvey H. Haley
Jonesboro	Fred Keller
Little Rock	R. C. Hall
Malvern	B. J. Glover
No. Little Rock	T. H. Alford
Paragould	C. S. Blackburn
Pine Bluff	J. R. Allen
Russellville	E. W. Bass
Texarkana	P. N. Bragg
Van Buren	D. M. Riggin
California	
Alameda	Wm. G. Paden
Albany	John Franklin West
Alhambra	Geo. E. Bettinger
Anaheim	M. A. Gauer
Arcadia	H. F. Aker
Bakersfield	L. E. Chenoweth
Bell	.....
Berkeley	Lewis W. Smith
Beverly Hills	E. J. Hummel
Brawley	Geo. K. Anderson (Elementary)
Burbank	B. F. Enyeart
Burlingame	L. D. Henderson
Calexico	J. W. Lawson
Chico	F. L. Cummings
Colton	J. H. Waldron
Compton	Ardelle B. Tibbey
Corona	Glen D. Wight
Coronado	F. A. Boyer (Elementary) J. Leslie Cutler (High)
Culver City	Bessie O. Brown
Daly City	R. L. Crane
El Centro	Guy A. Weakley
Eureka	G. B. Albee
Fresno	O. S. Hubbard
Fullerton	R. E. Green
Glendale	R. D. White
Hanford	C. E. Denham
Hawthorne	Herman A. Buckner
Hayward	Robert M. Reid (Elementary)
Inglewood	George M. Green (High) Robert E. Cralle (Elementary)
Lodi	LeRoy Nichols
Long Beach	H. S. Upjohn
Los Angeles	F. A. Bouelle
Lynwood	Coral F. Mercer
Martinez	Forrest V. Routt
Marysville	W. A. Kynoch (Elementary)
Maywood	.....
Merced	W. M. Smith
Modesto	J. H. Bradley
Monrovia	J. Warren Ayer
Montebello	Mark R. Jacobs
Monterey	J. H. Graves (Elementary) J. R. McKillop (High)
Monterey Park	.....
Napa	Eva Holmes
National City	Fred M. Tonge
Oakland	W. E. Givens
Ontario	C. W. Randall
Orange	G. C. Sherwood
Oxnard	R. B. Haydock
Pacific Grove	R. H. Down
Palo Alto	A. C. Barker
Pasadena	J. A. Sexson
Petaluma	David M. Durst
Piedmont	Harry W. Jones
Pittsburg	F. S. Ramsdell
Pomona	Emmett Clark
Porterville	C. E. Bigham
Redlands	H. G. Clement
Redondo Beach	F. F. Martin (Elementary) Aileen S. Hammond (High)
Redwood City	John Gill
Richmond	W. T. Helms
Riverside	Ira C. Landis
Roseville	W. T. Eich
Sacramento	C. C. Hughes
Salinas	R. D. Case
San Bernardino	Lewis E. Adams
San Diego	Will C. Crawford
San Fernando	.....
San Francisco	Edwin A. Lee
San Gabriel	R. B. Walter
San Jose	W. L. Bachrodt
San Leandro	W. O. Davies
San Luis Obispo	Charles E. Teach
San Mateo	George W. Hall (Elementary) Homer Martin (High)
San Rafael	O. R. Hartzell
Santa Ana	Frank A. Henderson
Santa Barbara	Curtis E. Warren
Santa Clara	.....
Santa Cruz	C. R. Holbrook
Santa Maria	Robert Bruce
Santa Monica	Percy R. Davis
Santa Paula	George A. Bond (Elementary) F. M. Eakin (High)
Santa Rosa	Jerome O. Cross
South Gate	.....
South Pasadena	George C. Bush
South San Francisco	A. C. Kleemeyer (Elementary) Guy Roney (High)
Stockton	Ansel S. Williams
Taft	James A. Joyce (Elementary)
Torrance	.....
Tulare	W. B. Knokey
Vallejo	Elmer L. Cave
Ventura	E. L. Van Dellen
Visalia	DeWitt Montgomery
Watsonville	T. S. MacQuiddy
Whittier	Will Wiley (Elementary) D. A. Stouffer (High)
Woodland	T. L. Whitehead
Colorado	
Alamosa	G. P. Young
Boulder	Virgil M. Rogers
Canon City	L. L. Beahm

City	Superintendent
Colorado Springs	H. M. Corning
Denver	A. L. Threlkeld
Durango	Emory E. Smiley
Englewood	R. D. Jenkins
Fort Collins	Ward I. Miller
Grand Junction	R. E. Tope
Greeley	Hubert D. Eldridge
La Junta	G. T. Wilson
Longmont	Kent L. Sanborn
Loveland	R. W. Truscott
Pueblo	District No. 1, J. H. Risley District No. 20, J. F. Keating
Salida	L. D. Hightower
Sterling	R. R. Knowles
Trinidad	William R. Ross
Walsenburg	S. M. Andrews
Connecticut	
Ansonia	John J. Stevens
Bridgeport	Worcester Warren
Bristol	Karl A. Reiche
Danbury	Harold F. Dow
Darien	Edward H. Fuller
Derby	Richard T. Tobin
E. Hartford	P. S. Barnes
E. Haven	W. E. Gillis
Enfield	E. H. Parkman
Fairfield	A. M. McCullough
Glastonbury	Francis S. Knox
Greenwich	Edwin C. Andrews
Griswold	Ernest Lake
Hamden	Margaret L. Keefe
Hartford	Fred D. Wish, Jr.
Killingly	W. E. Parker
Manchester	Fred A. Verplanck
Meriden	Nicholas Moseley
Middletown	Fred W. Shearer
Middletown (twn)	Van Buren Moody
Milford	C. W. Maddocks
Naugatuck	H. E. Chittenden
New Britain	S. H. Holmes
New Haven	John C. McCarthy
New London	Warren A. Hanson
Norwalk	Philip A. Jakob
Norwich	E. J. Graham
Plainfield	J. L. Chapman
Plainville	J. Wendell Yeo
Plymouth	H. S. Fisher
Putnam	Carl M. Diefenbach
Seymour	R. C. Clark
Shelton	Harry E. Fowler
Southington	William Strong
Stafford	Earl M. Witt
Stamford	Leon C. Staples
Stratford	E. Ward Ireland
Torrington	G. J. Vogel
Vernon	H. O. Clough
Wallingford	H. M. Jeffords
Waterbury	Thomas J. Condon
Watertown	G. C. Swift
West Hartford	Lloyd H. Bugbee
West Haven	Seth G. Haley
Westport	Heath E. White
Wethersfield	Wilson Greer
Winchester	L. R. McKusick
Windham	Egbert A. Case
Windsor	Earle S. Russell
Delaware	
Wilmington	S. M. Stouffer
District of Columbia	
Washington	Frank W. Ballou
Florida	
Bartow	F. E. Brigham (a)
Bradenton	Jessie P. Miller (a)
Clearwater	George M. Lynch (a)
Coral Gables	Charles M. Fisher (a)
Daytona Beach	G. W. Marks (a)
Deland	G. W. Marks (a)
Fort Lauderdale	Ulric J. Bennett (a)
Fort Myers	Harry F. Hendry (a)
Gainesville	Horace F. Zetrouer (a)
Jacksonville	R. C. Marshall (a)
Key West	M. E. Russell (a)
Lakeland	C. I. Hollingsworth
Lake Worth	J. A. Youngblood (a)
Miami	Charles M. Fisher (a)
Miami Beach	Charles M. Fisher (a)
Ocala	Don T. Mann (a)
Orlando	Judson B. Walker (a)
Palatka	L. S. Barstow (a)
Panama City	A. L. Hardy
Pensacola	J. H. Varnum (a)
Plant City	E. L. Robinson (a)
River Junction	C. H. Gray (a)
St. Augustine	D. D. Corbett (a)
St. Petersburg	G. M. Lynch (a)
Sanford	T. W. Lawton (a)
Sarasota	T. W. Yarbrough
South Jacksonville	R. C. Marshall (a)
Tallahassee	F. S. Hartsfield (a)
Tampa	E. L. Robinson (a)
West Palm Beach	J. A. Youngblood (a)
Winter Haven	C. I. Hollingsworth
Georgia	
Albany	R. E. Brooks
Americus	J. E. Mathis
Athens	B. M. Grier
Atlanta	W. A. Sutton
Augusta	S. D. Copeland
Bainbridge	E. G. Elcan
Brunswick	R. D. Eadie
Carrollton	M. C. Wiley
Cartersville	W. H. Tucker, Jr.
Cedartown	J. E. Purks
Columbus	R. B. Daniel
Cordele	D. H. Standard
Dalton	J. W. Williams
Decatur	Lamar Ferguson
Dublin	A. J. Hargrove
East Point	Paul West
Fitzgerald	W. W. Stancil
Gainesville	C. J. Cheves
Griffin	G. W. Wannamaker
Lagrange	F. F. Rowe
Macon	W. P. Jones
Marietta	C. A. Keith
Milledgeville	Col. J. H. Jenkins
Moultrie	J. L. Yaden
Newnan	C. B. Mathews
Rome	B. F. Quigg
Savannah	O. B. Strong
Thomasville	B. B. Broughton
Valdosta	A. G. Cleveland
Waycross	Ralph Newton
Idaho	
Boise	W. D. Vincent
Coeur d'Alene	G. O. Phippeny
Idaho Falls	W. W. Christensen
Lewiston	Glenn W. Todd
Nampa	J. E. Walsh
Pocatello	J. M. McDonald
Twin Falls	W. B. Smith
Illinois	
Alton	W. R. Curtis
Aurora	K. D. Waldo (East Side) D. B. Heller (West Side)
Batavia	H. C. Storm
Beardstown	W. L. Gard
Belleville	H. V. Calhoun
Belvidere	R. E. Garrett
Benton	Charles M. Johnson
Berwyn	William Hawkes (Dist. No. 98) E. W. Martin (Dist. No. 100)
Bloomington	S. K. McDowell
Blue Island	J. E. Lemon
Brookfield	E. C. Cassady
Cairo	Leo C. Schultz
Calumet City	J. A. Wieland
Canton	R. W. Hyndman
Carbondale	Raymond Hoffner
Centralia	R. V. Jordon
Champaign	V. L. Nickell
Charleston	U. B. Jeffries
Chicago	William J. Bogan
Chicago Heights	Ben A. Sylla
Cicero	G. A. Schwebel
Clinton	Arthur Verner
Collinsville	C. H. Dorris
Danville	C. E. Vance
Decatur	William Harris
De Kalb	F. W. Phillips
Des Plaines	E. R. Selleck
Dixon	A. H. Lancaster
Downers Grove	George De Wolf
Duquoin	Joe Strickler
East Moline	D. B. Hoffman
East Peoria	Paul L. Bolin
East St. Louis	D. Walter Potts
Edwardsville	E. L. Alexander
Elgin	Theodore Saam
Elmhurst	V. L. Beggs
Elmwood Park	George N. Wells
Evanston	J. R. Skiles (Dist. No. 75) David E. Walker (Dist. No. 76)
Forest Park	W. S. Dimmett
Freeport	B. F. Shafer
Galesburg	O. O. Young
Gillespie	J. W. White
Glencoe	Gordon N. Mackenzie
Glen Ellyn	S. A. Denison
Granite City	A. M. Wilson
Harrisburg	Roscoe Pulliam
Harvey	E. E. Bratcher
Herrin	John R. Creek
Highland Park	Jessie L. Smith (Dist. No. 107) R. H. Price (Dist. No. 108)
Hinsdale	Martin B. Travis
Hoopeston	W. R. Lowery
Jacksonville	R. O. Stoops
Johnston City	Earl E. Miller
Joliet	H. Ambrose Perrin
Kankakee	Irving Munson
Kewanee	Charles A. Bruner
La Grange	J. C. Davies
Lake Forest	J. E. Baggett
La Salle	J. B. McManus
Lawrenceville	M. N. Todd
Lincoln	D. F. Nichols
Litchfield	Allen J. Black
Lombard	Mrs. Ada Manning
Macomb	G. A. Selters
Madison	E. W. Heob
Marion	H. O. Belford
Mattoon	H. B. Black
Maywood	Eugene La Rowe
Melrose Park	Eugene La Rowe
Metropolis	C. J. Ramsay
Moline	E. P. Nutting
Monmouth	Roy Fetherston
Morris	B. R. Bowden
Mount Carmel	R. S. Condrey
Mount Vernon	H. E. Bosley
Murphysboro	Wm. H. Carruthers
Naperville	R. E. Beebe
Niles Center	R. E. Cotanche
Normal	Monroe Melton
North Chicago	F. E. De Yoe (Dist. No. 63) R. L. Newenham (Dist. No. 64)
Oak Park	W. J. Hamilton
Olney	C. T. Cramer
Ottawa	C. J. Byrne
Pana	J. L. Hart
Paris	John R. Moss
Park Ridge	Harry D. Winslow
Pekin	C. B. Smith
Peoria	E. C. Fisher
Peru	A. H. Karn
Pontiac	A. F. Speltz
Quincy	W. E. Nelson
River Forest	Anna L. Shinn
Riverside	L. J. Hanser
Rockford	Frank A. Jensen
Rock Island	S. H. Berg
St. Charles	G. E. Thompson
Savanna	.....
Springfield	Frank T. Vasey
Spring Valley	James Nesti
Sterling	O. A. Fackler (Dist. No. 11) H. U. Challand (Dist. No. 10)
Streator	H. Whittier
Summit	T. H. Pease

City	Superintendent
Taylorville	G. W. Wilcockson
Urbana	T. H. Cobb
Venice	Sam Long
Villa Park	H. E. Hinkel
Waukegan	John S. Clark
West Frankfort	C. A. Waller
Wheaton	K. K. Tibbetts
Wilmette	J. R. Harper
Winnetka	C. W. Washburne
Wood River	G. A. Smith
Woodstock	W. J. Calahan
Zion	Edgar T. Stephens
Indiana	
Anderson	Arthur Campbell
Auburn	H. L. McKenney
Bedford	Warren J. Yount
Bicknell	Harold Axe
Bloomington	W. F. Vogel
Bluffton	O. M. Craig
Brazil	C. P. Keller
Clinton	E. L. Boyd
Columbus	Donald Du Shane
Connersville	E. C. Dodson
Crawfordsville	M. C. Darnall
Decatur	M. F. Worthman
East Chicago	Roy Feik
Elkhart	J. F. Wiley
Elwood	William F. Smith
Evansville	Ralph Irons
Fort Wayne	Merle Abbett (c)
Frankfort	John Linebarger
Franklin	R. W. Sheek
Gary	William A. Wirt
Goshen	J. W. Foreman
Greensburg	Elmer C. Jerman
Hammond	L. L. Caldwell
Hartford City	H. Paul Kelsay
Hobart	Guy Dickey
Huntington	J. M. Scudder
Indianapolis	Paul C. Stetson
Jeffersonville	E. G. McCullum
Kendallville	H. M. Dixon
Kokomo	C. V. Haworth
Lafayette	Morris McCarty
La Porte	E. B. Wetherow
Lebanon	Paul Van Riper
Linton	T. J. Beecher
Logansport	W. L. Sprouse
Madison	E. O. Muncie
Marion	Elbert E. Day
Michigan City	Milo C. Murray
Mishawaka	P. C. Emmons
Mount Vernon	M. N. O'Bannon
Muncie	D. W. Horton
New Albany	H. A. Buerk
New Castle	E. J. Llewelyn
Peru	J. P. Crodion
Plymouth	Ray Kuhn
Portland	J. C. Webb
Princeton	G. E. Derbyshire
Richmond	W. G. Bate
Rushville	L. A. Lockwood
Seymour	N. J. Lasher
Shelbyville	W. F. Loper
South Bend	Frank E. Allen
Sullivan	Dale C. Billman
Terre Haute	George C. Carroll
Valparaiso	Roy B. Julian
Vincinnes	V. L. Eikenberry
Wabash	O. J. Neighbours
Warsaw	James M. Leffel
Washington	J. H. Shipp
West Lafayette	F. A. Burtsfield
Whiting	W. W. Borden
Iowa	
Ames	M. G. Davis
Atlantic	J. P. Street
Boone	G. S. Wooten
Burlington	W. G. Brooks
Cedar Falls	F. L. Mahannah
Cedar Rapids	Arthur Deamer
Centerville	E. W. Fannon
Chariton	J. R. Cougill
Charles City	P. C. Lapham
Cherokee	N. D. McCombs
Clinton	C. W. Brown
Council Bluffs	J. A. True
Creston	Burton R. Jones
Davenport	Frank L. Smart
Des Moines	A. W. Merrill, Acting
Dubuque	E. D. Cline
Fairfield	W. G. Pence
Fort Dodge	K. D. Miller
Fort Madison	A. I. Tiss
Iowa City	I. A. Opstad
Keokuk	R. L. Reid
Marshalltown	W. F. Shirley
Mason City	R. B. Irons
Muscatine	H. Van Hettinga
Newton	B. C. Berg
Oelwein	G. B. Ferrell
Oskaloosa	R. B. Newman
Ottumwa	Roy F. Hannum
Perry	W. G. Clark
Red Oak	J. R. Inman
Shenandoah	W. Dean McKee
Sioux City	L. W. Feik
Spencer	H. J. Williams
Waterloo	J. M. Logan (East Side) Charles A. Kittrell (West Side)
Webster City	Burrus E. Beard
Kansas	
Abilene	F. C. Gardner
Arkansas City	C. E. St. John
Atchison	W. D. Wolfe
Chanute	L. H. Petit
Coffeyville	A. I. Decker
Concordia	E. B. Allbaugh
Dodge City	W. M. Richards
Eldorado	J. F. Hughes
Emporia	L. A. Lowther
Fort Scott	V. M. Liston
Garden City	Ira O. Scott
Great Bend	H. C. Scarborough
Hutchinson	J. W. Gowans
Independence	J. H. Clement
Iola	John Fleming
Junction City	W. A. Wood
Kansas City	F. L. Schlagle
Lawrence	C. E. Birch
Leavenworth	I. J. Bright
Liberal	N. B. Mahuron
Manhattan	W. E. Sheffer
McPherson	R. W. Potwin
Newton	J. B. Heffelfinger
Ottawa	G. H. Marshall
Parsons	R. H. Hughes
Pittsburg	M. M. Rose
Pratt	Amos W. Glad
Salina	W. S. Heusner
Topeka	A. J. Stout
Wellington	Grady Booker
Wichita	L. W. Mayberry
Winfield	Evan E. Evans
Kentucky	
Ashland	W. L. Brooker
Bellevue	L. F. Gilligan
Bowling Green	T. C. Cherry
Catlettsburg	J. T. Miracle
Corbin	G. W. Campbell
Covington	G. O. Swing
Danville	L. C. Bosley
Dayton	Olin W. Davis
Fort Thomas	D. W. Bridges
Frankfort	J. W. Ireland
Glasgow	W. H. Sugg
Hazard	R. T. Whittinghill
Henderson	C. E. Dudley
Hopkinsville	Gladstone Koffman
Jenkins	C. V. Snapp
Lexington	Henry H. Hill
Louisville	Frederick Archer
Ludlow	J. S. Brown
Madisonville	Harper Gatton
Mayfield	K. R. Patterson
Maysville	John Shaw
Middlesboro	J. W. Bradner
Newport	A. D. Owens
Owensboro	J. L. Foust
Paducah	H. L. Smith
Paris	Lee Kirkpatrick
Richmond	W. F. O'Donnell
Somerset	P. H. Hopkins
Winchester	E. F. Birckhead
Louisiana	
Alexandria	H. M. Wells (b)
Bastrop	E. D. Shaw (b)
Baton Rouge	W. B. Hatcher (b)
Bogalusa	M. O. Rudolph
Crowley	A. T. Browne (b)
Gretna	J. C. Ellis (b)
Hammond	C. C. Pittman (b)
Houma	H. L. Bourgeois (b)
Lafayette	J. W. Faulk (b)
Lake Charles	Ward Anderson
Minden	E. S. Richardson (b)
Monroe	E. L. Neville
Morgan City	L. A. Law (b)
New Iberia	L. G. Porter (b)
New Orleans	Nicholas Bauer (b)
Opelousas	W. B. Prescott (b)
Plaquemine	L. P. Terrebonne (b)
Shreveport	E. W. Jones (b)
West Monroe	T. O. Brown (b)
Maine	
Auburn	G. R. Gardner
Augusta	F. W. Burrill
Bangor	I. W. Small
Bath	C. D. Wilson
Biddeford	A. A. Garcelon
Brewer	H. R. Houston
Brunswick	Leon P. Spinney
Calais	Alden Allen
Caribou	G. M. Carter
Gardiner	A. R. Carter
Houlton	George Cumming
Lewiston	C. W. Bickford
Millinocket	W. M. Marr
Oldtown	W. O. Chase
Portland	W. B. Jack
Rockland	E. L. Toner
Rumford	L. E. Williams
Saco	H. C. Hull
Sanford	J. A. Hamlin
Skowhegan	W. B. Woodbury
South Portland	L. C. Day
Waterville	C. E. Glover
Westbrook	Guy Sinclair
Maryland	
Annapolis	George Fox (a)
Baltimore	D. E. Weglein
Cambridge	J. B. Noble (a)
Cumberland	C. L. Kopp (a)
Frederick	E. W. Pruitt (a)
Frostburg	C. L. Kopp (a)
Hagerstown	B. J. Grimes (a)
Salisbury	J. M. Bennett (a)
Tacoma Park	Edwin W. Broome (a)
Massachusetts	
Abington	C. A. Record
Adams	Henry L. Cecil
Agawam	B. J. Phelps
Amesbury	Fred C. English
Amherst	J. O. Cook
Andover	H. C. Sanborn
Arlington	C. H. Dempsey
Athol	L. M. Farrin
Attleboro	L. A. Fales
Auburn	C. M. Harris
Barnstable	R. R. Barr
Belmont	F. A. Scott
Beverly	S. H. Chace
Billerica	E. C. Vining
Boston	P. T. Campbell
Braintree	C. E. Fisher
Bridgewater	John C. Davis
Brockton	J. F. Scully
Brookline	E. R. Caverly
Cambridge	M. E. Fitzgerald
Canton	A. S. Ames
Chelmsford	G. S. Wright
Chelsea	G. C. Francis
Chicopee	J. J. Desmond, Jr.
Clinton	T. F. Gibbons
Concord	W. A. Hall
Danvers	I. G. Smith
Dartmouth	A. R. Paull
Dedham	J. C. Anthony
Dracut	C. L. Randall
Easthampton	H. D. Casey

City	Superintendent
Easton	G. C. Mann
Everett	F. A. Ashley
Fairhaven	C. F. Prior
Fall River	H. L. Belisle
Fitchburg	J. M. McNamara
Foxborough	Chase McArthur
Framingham	B. J. Merriam
Franklin	A. W. Hale
Gardner	F. T. Reynolds
Gloucester	E. W. Fellows
Grafton	A. S. Cole
Great Barrington	R. H. Bellows
Greenfield	F. W. Porter
Haverhill	A. L. Barbour
Hingham	O. K. Collins
Holyoke	W. R. Peck
Hudson	B. D. Brown
Ipswich	J. I. Horton
Lawrence	B. M. Sheridan
Leominster	W. H. Perry
Lexington	T. S. Grindle
Lowell	V. M. McCartin
Ludlow	P. R. Baird
Lynn	H. S. Gruver
Malden	F. G. Marshall
Mansfield	G. S. Goodell
Marblehead	James W. Vose
Marlboro	E. P. Carr
Maynard	J. P. King
Medford	J. S. Kadesch
Melrose	H. H. Stuart
Methuen	L. H. Conant
Middleboro	J. S. Cushing
Milford	A. O. Caswell
Millbury	C. C. Ferguson
Milton	H. F. Turner
Montague	J. S. Keating
Natick	C. R. Hall
Needham	Harry A. Brown
New Bedford	A. P. Keith
Newburyport	S. M. King
Newton	Julius Warren
North Adams	G. C. Bowman
Northampton	F. K. Congdon
North Andover	F. E. Pitkin
North Attleboro	G. W. Morris
Northbridge	H. J. Phipps
Norwood	L. W. Grant
Orange	E. C. Hempel
Palmer	C. H. Hobson
Peabody	Wm. A. Welch
Pittsfield	Edward J. Russell
Plymouth	A. B. Handy
Quincy	J. N. Muir
Randolph	A. O. Christiansen
Reading	Arthur E. Pierce
Revere	C. F. Lindstol
Rockland	R. S. Esten
Salem	G. M. Bemis
Saugus	Vernon W. Evans
Shrewsbury	M. A. Sturtevant
Somerset	H. F. Bates
Somerville	E. W. Ireland
Southbridge	Fuller L. Austin
South Hadley	R. D. Tucker
Spencer	I. H. Agard
Springfield	John E. Granrud
Stoneham	C. E. Varney
Stoughton	Warren B. Lyman
Swampscott	Frank L. Mansur
Taunton	W. A. Mowry
Tewksbury	S. G. Bean
Uxbridge	A. B. Garcelon
Wakefield	W. B. Atwell
Walpole	A. C. Jones
Waltham	W. H. Slayton
Ware	W. R. Barry
Wareham	Bion C. Merry
Watertown	W. H. Price
Webster	J. A. Lobban
Wellesley	S. M. Graves
Westboro	J. H. Armstrong
Westfield	C. D. Stiles
West Springfield	J. R. Fausey
Weymouth	P. T. Pearson
Whitman	F. E. Holt
Winchendon	G. W. Vail
Winchester	J. J. Quinn
Winthrop	E. R. Clarke
Woburn	G. I. Clapp
Worcester	W. S. Young

City	Superintendent
Michigan	
Adrian	Ernest J. Reed
Albion	Don Harrington
Alma	F. R. Phillips
Alpena	George H. Curtis
Ann Arbor	O. W. Haisley
Battle Creek	W. G. Coburn
Bay City	G. L. Jenner
Benton Harbor	S. C. Mitchell
Berkeley	R. B. French
Birmingham	C. W. Crandell
Cadillac	B. C. Shankland
Charlotte	Jay Dykhouse
Coldwater	J. T. Symons
Dearborn	Ray H. Adams
Detroit	Frank Cody
Dowagiac	C. M. Horn
East Detroit	John Kantner
Ecorse	C. J. Miller
Escanaba	R. E. Cheney
Ferndale	E. F. Down
Flint	L. H. Lamb
Gladstone	A. R. Watson
Grand Haven	E. H. Babcock
Grand Rapids	L. A. Butler
Grosse Pointe	S. M. Brownell
Grosse Pointe Park	
Hamtramck	M. R. Keyworth
Hancock	H. S. Denison
Hastings	D. A. Van Buskirk
Highland Park	I. M. Allen
Hillsdale	B. L. Davis
Holland	E. E. Fell
Ionia	A. A. Rather
Iron Mountain	M. B. Travis
Ironwood	Arthur E. Erickson
Ishpeming	C. L. Phelps
Jackson	Harold Steele
Kalamazoo	Herold C. Hunt
Kingsford	Frank C. Sweeney
Lansing	J. W. Sexton
Lapeer	E. E. Irwin
Lincoln Park	Leo W. Huff
Ludington	H. H. Hawley
Manistee	Benj. Klager
Manistique	A. F. Hall
Marquette	W. M. Whitman
Marshall	H. W. Holmes
Menominee	J. L. Silvernale
Midland	J. J. Schafer
Monroe	George T. Cantrick
Mount Clemens	L. W. Fast
Mount Pleasant	G. E. Ganiard
Muskegon	John A. Craig
Muskegon Heights	W. R. Booker
Negaunee	H. S. Doolittle
Niles	F. W. Crawford
Owosso	E. J. Willman
Petoskey	H. C. Spitler
Pontiac	James H. Harris
Port Huron	L. A. Packard
River Rouge	A. McDonald
Roseville	A. A. Neverth
Royal Oak	N. J. Quickstad
Saginaw	C. F. Miller
St. Clair Shores	T. V. Eddy
St. Joseph	E. P. Clarke
Sault Ste. Marie	G. G. Malcolm
Sturgis	Waldo Adams
Three Rivers	C. H. Carrick
Traverse City	Lars Hockstad
Ypsilanti	E. H. Chapelle
Minnesota	
Albert Lea	H. R. Peterson
Austin	S. T. Neveln
Bemidji	J. W. Smith
Brainerd	W. C. Cobb
Chisholm	J. P. Vaughan
Cloquet	E. B. Anderson
Columbia Heights	H. C. Nelson
Crookston	Arnold Gloor
Duluth	Leonard Young
Ely	W. E. Englund
Eveleth	A. D. S. Gillett
Fairmont	John J. Skinner
Faribault	H. H. Kirk
Fergus Falls	R. L. Brown

City	Superintendent
Hastings	E. A. Durbahn
Hibbing	J. W. Richardson
International Falls	J. A. Sathrum
Little Falls	E. C. Van Dusen
Mankato	J. E. Anderson
Minneapolis	C. R. Reed
Moorhead	S. G. Reinertsen
New Ulm	F. B. Andreen
Owatonna	Irvin E. Rosa
Red Wing	G. V. Kinney
Rochester	G. H. Sanberg
St. Cloud	H. B. Gough
St. Paul	S. O. Hartwell
South St. Paul	Irvin T. Simley
Stillwater	Guy D. Smith
Virginia	R. H. Brown
Willmar	A. M. Wisness
Winona	D. F. Dickerson
Mississippi	
Biloxi	G. W. Ditto
Brookhaven	Edgar S. Bowlus
Clarksdale	H. B. Heidelberg
Columbus	C. N. Brandon
Corinth	Hal Anderson
Greenville	F. W. Murphy
Greenwood	W. C. Williams
Gulfport	B. Frank Brown
Hattiesburg	W. I. Thames
Jackson	J. G. Chastain
Laurel	R. H. Watkins
McComb	Joseph E. Gibson
Meridian	H. M. Ivy
Natchez	W. H. Braden
Tupelo	Charles F. Capps
Vicksburg	H. V. Cooper
Yazoo City	R. J. Koonce
Missouri	
Boonville	L. E. Ziegler
Brookfield	L. V. Crookshank
Cape Girardeau	J. A. Whiteford
Carthage	J. L. Campbell
Chillicothe	E. R. Adams
Clayton	John L. Bracken
Clinton	Arthur Lee
Columbia	W. E. Rosenstengel
De Soto	O. T. Coil
Fulton	J. T. Bush
Hannibal	E. T. Miller
Independence	E. B. Street
Jefferson City	William F. Knox
Joplin	E. A. Elliott
Kansas City	George Melcher
Kirksville	J. H. Neville
Kirkwood	F. P. Tillman
Maplewood	G. E. Dille
Marshall	W. M. Westbrook
Maryville	J. L. Lawing
Mexico	L. H. Hawthorne
Moberly	M. F. Beach
Nevada	Wade Fowler
Poplar Bluff	G. F. Loughead
Richmond	P. L. Collier
St. Charles	Stephen Blackhurst
St. Joseph	I. E. Stutsman
St. Louis	Henry J. Gerling
Sedalia	Heber U. Hunt
Sikeston	Roy V. Ellise
Springfield	Harry P. Study
Trenton	W. H. McDonald
University City	Charles Banks
Warrensburg	Edward Beatty
Washington	C. J. Burger
Webb City	D. R. McDonald
Webster Groves	W. E. Goslin
Montana	
Anaconda	W. K. Dwyer
Billings	A. T. Peterson
Bozeman	D. S. Williams
Butte	Douglas Gold
Great Falls	Irving W. Smith
Havre	W. J. Shirley
Helena	R. O. Evans
Kalispell	W. D. Swetland
Lewistown	C. G. Manning
Livingston	B. A. Winans
Miles City	Glen G. Eye
Missoula	Ira B. Fee

City	Superintendent
Nebraska	
Alliance	H. G. Partridge
Beatrice	E. L. Novotny
Columbus	R. R. McGee
Fairbury	W. E. Scott
Falls City	A. B. Gelwick
Fremont	A. H. Waterhouse
Grand Island	C. Ray Gates
Hastings	A. H. Staley
Kearney	Harry A. Burke
Lincoln	M. C. Leffer
McCook	J. C. Mitchell
Nebraska City	Marion R. Schrader
Norfolk	A. P. Burkhart
North Platte	W. J. Braham
Omaha	Homer W. Anderson
Scottsbluff	A. L. Burnham
York	Earle W. Wiltse
Nevada	
Las Vegas	Maude Frazier
Reno	B. D. Billinghurst
New Hampshire	
Berlin	Lloyd P. Young
Claremont	A. B. Kellogg
Concord	Charles W. Walker, Acting
Derry	George H. Whitcher
Dover	Chester L. Howe
Franklin	Fred S. Libbey
Keene	Laurence O. Thompson
Laconia	John S. Gilman
Lebanon	W. J. English
Manchester	L. P. Benezet
Nashua	Earle T. Tracey
Portsmouth	Harry L. Moore
Rochester	Arthur S. Rollins
Somersworth	H. L. Winslow
New Jersey	
Asbury Park	A. E. Kraybill
Atlantic City	Arthur Chenoweth
Audubon	William L. Fidler
Bayonne	Preston H. Smith
Belleville	W. R. Parmer
Bergenfield	Roy W. Brown
Bloomfield	Edgar S. Stover
Bogota	Frank E. Tilton
Boonton	M. Burr Mann
Bound Brook	Albert S. Davis
Bridgeton	Leigh M. Lott
Burlington	Vann H. Smith
Caldwell	D. C. Barnett
Camden	Leon N. Neulen
Carlstadt	Edward F. Krom
Carteret	Barbara V. Hermann
Cliffside Park	George F. Hall
Clifton	George J. Smith
Collingswood	John B. Ritter
Cranford	Sarah Edmond
Dover	R. S. Bowlby
Dumont	L. J. Houiss
Dunellen	R. W. Crane
East Orange	C. J. Scott
East Rutherford	Alfred S. Faust
Elizabeth	Ira T. Chapman
Englewood	Winton J. White
Fairview	Z. G. Masten, Jr.
Fort Lee	J. B. Thompson
Freehold	Lloyd S. Cassel
Garfield	J. Earl Thompson
Glen Ridge	H. W. Dutch
Gloucester	Charles T. Hassard
Guttenburg	Mrs. Anna L. Klein
Hackensack	John A. Wilcox
Haddonfield	Allen S. Martin
Haddon Heights	William C. Davis
Hammonton	H. H. Smith
Harrison	John P. Murray
Hasbrouck H'ghts	C. C. Hitchcock
Hawthorne	F. H. Thoms
Highland Park	F. Willard Furth
Hillside	A. G. Woodfield
Hoboken	Daniel S. Kealey
Irvington	Herschel S. Libby
Jersey City	James A. Nugent
Kearny	Edmund L. Tink
Leonia	Nelson C. Smith
Linden	D. A. Howell
Lodi	Henry V. Matthews
Long Branch	Charles T. Stone
Lyndhurst	H. P. Shepherd
Madison	Harry A. Wann
Manville	Harold I. Merritt
Metuchen	Carl H. Galloway
Millville	Wylie G. Pate
Montclair	Frank G. Pickell
Morristown	J. Burton Wiley
Neptune Towns'p	O. J. Moulton
Newark	John H. Logan
New Brunswick	F. J. Sickles
Newton	C. H. Reagle
North Arlington	J. A. Lindsay
North Bergen	R. W. Madden
Nutley	John A. Spargo
Ocean City	George E. Brown
Orange	W. B. Patrick
Palisades Park	Robert B. Havington
Passaic	A. D. Arnold
Paterson	John R. Wilson
Paulsboro	Fred A. Talbot
Pensauken Twp.	George B. Fine
Perth Amboy	W. C. McGinniss
Phillipsburg	C. V. Sloan
Plainfield	F. W. Cook
Pleasantville	Simon M. Horstick
Princeton	B. Woodhull Davis
Prospect Park	Thomas L. Bump
Rahway	Arthur Perry
Red Bank	Edwin C. Gilland
Ridgefield	Charles Dixon
Ridgewood	I. B. Somerville
Roselle	John R. Patterson
Roselle Park	E. F. Smith
Rutherford	C. A. Fetterly
Salem	Halliday R. Jackson
Sayreville	Jesse Selover
Secaucus	M. J. Pechtel
Somerville	T. Latimer Brooks
South Amboy	Oscar O. Barr
South Orange	John H. Bosshart
South Plainfield	Harry C. Fries
South River	William S. Lesh
Summit	John B. Dougall
Teaneck	Lester N. Neulen
Tenafly	George A. Kipp
Trenton	Paul Loser
Union City	Arthur O. Smith
Union Twp.	Edward F. Waldron
Verona	F. N. Brown
Vineland	Lawrence R. Winchell
Wallington	Joseph F. Moriarty
Weehawken	Kenneth F. Woodbury
Westfield	C. A. Philhower
West New York	H. L. Bain
West Orange	S. C. Strong
Woodridge	F. D. Donley
New Mexico	
Albuquerque	John Milne
Clovis	J. M. Bickley
Gallup	Agnes Bartlett
Las Cruces	L. M. Cook
Raton	E. E. Harrison
Roswell	D. N. Pone
Santa Fe	Isabel L. Eckles
New York	
Albany	Austin R. Coulson
Amsterdam	Wilbur H. Lynch
Auburn	George F. Barford
Batavia	Clyde P. Wells
Beacon	E. D. Hewes
Binghamton	Daniel J. Kelly
Bronxville	Willard W. Beatty
Buffalo	E. C. Hartwell
Canandaigua	Frank E. Fisk
Catskill	J. T. Kaemmerlen
Cohoes	William S. Schneider
Corning	William E. Severn (Dist. No. 9)
	Hugh W. Gregg (Dist. No. 13)
Cortland	Leo T. Wilcox
Depew	George R. Crego
Dobbs Ferry	J. A. McGinness
Dunkirk	F. R. Darling
East Rochester	Theodore L. R. Morgan
Elmira	H. O. Hutchinson
Elmira Heights	John W. Sahlstrom
Endicott	Herbert H. Crumb
Floral Park	
Fredonia	Claude R. Dye
Freeport	John W. Dodd
Fulton	George R. Bodley
Garden City	Winfield A. Townsend
Geneva	W. L. Houseman
Glen Cove	H. H. Chapman
Glens Falls	A. W. Miller
Gloversville	H. W. Langworthy
Hastings-on-Hudson	John L. Hopkins
Haverstraw	A. P. Burroughs
Hempstead	William A. Gore
Herkimer	Loraine W. Bills
Hornell	Harrison S. Dodge
Hudson	M. C. Smith
Hudson Falls	David R. Finley
Ilion	Earl P. Watkin
Ithaca	C. L. Kulp
Jamestown	George A. Persell
Johnson City	H. B. Eccleston
Johnstown	E. L. Ackley
Kenmore	F. C. Densberger
Kingston	B. C. Van Ingen
Lackawanna	Clarence A. Conway
Lancaster	Frank L. Smith
Little Falls	Carlyle C. Ring
Lockport	R. B. Kelley
Long Beach	Walter J. Schwalje
Lynbrook	C. D. Vosburgh
Malone	Horace H. Lamberton
Mamaroneck	Arthur Z. Boothby
Massena	E. G. Simmons
Mechanicville	John N. Hayes
Medina	H. E. Brown
Middletown	E. H. Burdick
Mineola	Harlan B. Allen
Mount Kisco	H. M. Jennings
Mount Vernon	William H. Holmes
Newark	F. Neff Stroup
Newburgh	Marion W. Longman
New Rochelle	C. S. Bragdon
New York	Harold G. Campbell
Niagara Falls	James F. Taylor
North Tarrytown	Ernest E. Oertel
North Tonawanda	Claude L. Moss
Norwich	F. R. Wassung
Nyack	K. R. MacCalman
Ogdensburg	Arthur J. Laidlaw
Olean	W. C. Greenawalt
Oneida	Albert H. Covell
Oneonta	George J. Dann
Ossining	Harold V. Loomis
Oswego	Frederick Leighton
Patchogue	Sheridan Linn
Peekskill	Paul R. Spencer
Penn Yan	C. G. Hetherington
Plattsburg	G. M. Elmendorf
Port Chester	Evan E. Jones
Port Jervis	A. H. Naylor
Poughkeepsie	Ward C. Moon
Rensselaer	Walter S. Clark
Rochester	James M. Spinning
Rockville Center	Floyd B. Watson
Rome	George R. Staley
Rye Neck	Donald M. Tower
Salamanca	George A. Place
Saranac Lake	H. V. Littell
Saratoga Springs	Harris Crandall
Scarsdale	Vernon G. Smith
Schenectady	W. H. Pillsbury
Scotia	B. W. Conrad
Seneca Falls	Hubert Mott
Solvay	Claude A. Duvall
Syracuse	G. Carl Alverson
Tarrytown	J. Leroy Thompson
Tonawanda	Walter S. Fraser
Troy	Neil K. White (Lansingburg Dist.)
	George H. Krug (Union District)
Tupper Lake	R. E. Minnich
Utica	John A. De Camp
Watertown	C. E. Sabin
Watervliet	William Richmond
Waverly	P. C. Meserve
Wellsville	George F. Jammer
Whitehall	Page E. Cole
White Plains	H. Claude Hardy
Yonkers	Lamont F. Hodge

City	Superintendent
North Carolina	
Asheboro	R. J. Hilker
Asheville	W. L. Brooker
Burlington	H. M. Roland
Canton	A. J. Hutchins
Charlotte	H. P. Harding
Concord	A. S. Webb
Durham	W. F. Warren
Elizabeth City	E. E. Bundy
Fayetteville	Horace Sisk
Gastonia	W. P. Grier
Goldsboro	Ray Armstrong
Greensboro	Guy B. Phillips
Greenville	J. H. Rose
Henderson	E. M. Rollins
Hendersonville	F. M. Waters
Hickory	R. W. Carver
High Point	T. Wingate Andrews
Kings Mountain	B. N. Barnes
Kinston	W. A. Graham
Lenoir	C. S. Warren
Lexington	A. W. Honeycutt
Monroe	W. R. Kirkman
Mooresville	H. C. Miller
Morganton	W. F. Starnes
Mount Airy	L. B. Pendergraph
New Bern	H. B. Smith
Raleigh	P. S. Daniel
Reidsville	L. J. Perry
Rocky Mount	R. M. Wilson
Salisbury	J. H. Knox
Shelby	B. L. Smith
Statesville	R. M. Gray
Tarboro	W. A. Mahler
Thomasville	D. W. Maddox
Washington	E. S. Johnson
Wilmington	Ray Funderburk
Wilson	K. R. Curtis
Winston-Salem	R. H. Latham
North Dakota	
Bismarck	H. O. Saxvik
Devils Lake	F. H. Gilliland
Dickinson	P. S. Berg
Fargo	J. G. Moore
Grand Forks	Elroy Schroeder
Jamestown	C. L. Robertson
Mandan	J. C. Gould
Minot	L. A. White
Valley City	G. W. Hanna
Williston	J. N. Urness
Ohio	
Akron	Ralph H. Waterhouse
Alliance	B. F. Stanton
Ashland	E. L. Bowsher
Ashtabula	M. S. Mitchell
Athens	Harper C. Pendry
Barberton	U. L. Light
Bedford	A. E. Moody
Bellaire	J. V. Nelson
Bellefontaine	S. A. Frampton
Bellevue	D. H. Patton
Berea	A. G. Yawberg
Bexley	H. C. Dieterich
Bowling Green	Arch B. Conklin
Bucyrus	E. N. Dietrich
Cambridge	Hugh R. Hick
Campbell	Andrew S. Klinko
Canton	Jesse H. Mason
Chillicothe	W. L. Miller
Cincinnati	Edward D. Roberts
Circleville	Edwin L. Daley
Cleveland	Charles H. Lake
Cleveland H'ghts	Frank L. Wiley
Columbus	J. G. Collicott
Conneaut	C. M. Dickey
Coshocton	A. C. Pence
Cuyahoga Falls	Gilbert Roberts
Dayton	C. V. Courter
Defiance	B. M. Lindemuth
Delaware	D. R. Smith
Delphos	E. W. Bell
Dover	C. E. Palmer
East Cleveland	W. H. Kirk
East Liverpool	Herbert G. Means
East Palestine	T. R. Hersh
Elyria	R. C. Maston
Euclid	W. A. Franks
Findlay	I. F. Matteson
Fostoria	J. M. Reed
Fremont	H. H. Church
Galion	J. F. Bemiller
Gallipolis	Wayne Lutz
Garfield Heights	Harold R. Maurer
Girard	E. O. Trescott
Grandview H'ghts (Columbus P. O.)	W. C. Rohleder
Greenville	C. L. Bailey
Hamilton	D. R. Baker
Ironton	Carl E. Larson
Jackson	H. L. Bates
Kent	W. A. Walls
Kenton	L. E. McKinley
Lakewood	Geo. A. Bowman
Lancaster	C. L. Berry
Lima	R. E. Offenhauer
Lockland	J. U. Dungan
Logan	G. E. Carr
Lorain	D. J. Boone
Mansfield	W. W. Ankenbrand
Maple Heights (Bedford P. O.)	M. C. Helm
Marietta	H. L. Sullivan
Marion	C. A. Hudson
Martins Ferry	W. L. Kocher
Massillon	Harry R. Gorrell
Miamisburg	Harris V. Bear
Middletown	R. W. Solomon
Mingo Junction	Claude A. Bruner
Mount Vernon	A. W. Elliott
Nelsonville	E. J. Arnold
Newark	O. E. Pore
New Boston	D. E. Ross
New Philadelphia	H. S. Carroll
Niles	R. J. Kiefer
Norwalk	.....
Norwood	C. W. Johnson
Oakwood (Dayton P. O.)	A. E. Claggett
Painesville	C. C. Pierce
Parma	M. M. Berry
Piqua	G. C. Dietrich
Portsmouth	Frank Appel
Ravenna	C. R. Dustin
Reading	H. L. Bussey
Rocky River	J. J. Young
St. Bernard	F. M. Reynolds
St. Marys	C. C. McBroom
Salem	E. S. Kerr
Sandusky	F. J. Prout
Shaker Heights	F. H. Bair
Shelby	R. I. Lewis
Sidney	C. C. Crawford
Springfield	Carey Boggess, Acting
Steubenville	Russell H. Erwine
Struthers	H. E. Zuber
Tiffin	Paul V. Brown
Toledo	Ralph E. Dugdale
Toronto	S. C. Dennis
Troy	T. E. Hook
Uhrichsville	H. B. Galbraith
Urbana	C. W. Cookson
Van Wert	U. E. Diener
Wadsworth	Frank H. Close
Wapakoneta	M. R. Menschel
Warren	H. B. Turner
Washington Court House	A. D. St. Clair
Wellston	H. L. Holter
Wellsville	S. E. Daw
Wilmington	H. W. Hodson
Wooster	C. M. Layton
Xenia	L. C. Hammerle
Youngstown	Geo. E. Roudebush
Zanesville	C. T. Prose
Oklahoma	
Ada	B. R. Stubbs
Altus	A. G. Steele
Alva	C. A. Parker
Anadarko	H. L. Hensley
Ardmore	J. J. Godbey
Bartlesville	C. O. Haskell
Blackwell	Harry Hutson
Bristow	E. H. Black
Chickasha	T. T. Montgomery
Clinton	George D. Hann
Cushing	W. B. French
Duncan	Chester P. Davis
Durant	G. T. Stubbs
Elk City	A. M. Keeth
El Reno	H. E. Wrinkle
Enid	DeWitt Waller
Guthrie	W. A. Greene
Henryetta	E. E. Battles
Holdenville	Lanson D. Mitchell
Hugo	Harvey M. Black
Lawton	B. C. Swinney
McAlester	M. J. Hale
Miami	R. C. Nichols
Muskogee	J. R. Holmes
Norman	J. B. Stout
Oklahoma City	C. K. Reiff
Okmulgee	W. Max Chambers
Pawhuska	Homer C. Heard
Picher	August W. Weigl
Ponca City	W. W. Isle
Sand Springs	Clyde H. Odell
Sapulpa	E. O. Shaw
Seminole	John G. Mitchell
Shawnee	A. L. Burks
Stillwater	E. D. Price
Tulsa	Dr. Will French
Wewoka	Harry D. Simmons
Woodward	E. H. Homberger
Oregon	
Albany	Rex Putnam
Astoria	A. C. Hampton
Baker	Hugh Coleman
Bend	R. E. McCormack
Corvallis	H. W. Adams
Eugene	H. R. Goold
Klamath Falls	J. P. Wells
La Grande	Herbert Evans
Marshfield	Lynn A. Parr
Medford	E. H. Hedrick
Oregon City	J. T. Longfellow
Pendleton	Austin Landreth
Portland	Charles A. Rice
Salem	Silas Gaiser
The Dalles	C. W. Boetticher
Pennsylvania	
Abington	Edward S. Ling
Aliquippa	H. R. Vanderslice
Allentown	H. W. Dodd
Altoona	Robert E. Laramy
Ambridge	J. R. Miller
Archbald	W. A. Kelly
Arnold	Donald P. Davis
Ashland	Edward W. Taylor
Ashley	Robert C. Metz
Avalon	S. Todd Perley
Bangor	O. W. Ackerman
Beaver	D. H. Stewart
Beaver Falls	Floyd Atwell
Bellevue	Harry E. Brumbaugh
Berwick	M. E. Houck
Bethlehem	W. H. Weiss
Blairsville	B. L. Gumm
Blakely Boro (Address Peckville)	H. B. Anthony
Bloomsburg	L. P. Gilmore
Brackenridge	Robert R. Anderson
Braddock	T. G. McCleary
Bradford	James F. Butterworth
Brentwood	J. D. Boydston
Bridgeport	O. C. Smith
Bristol	Warren P. Snyder
Butler	John A. Gibson
Canonsburg	F. W. McVay
Carbondale	Marv B. McAndrew
Carlisle	J. W. Potter
Carnegie	Norman L. Glasser
Centerville	C. H. Lyons
Chambersburg	U. L. Gordy
Charleroi	T. L. Pollock
Cheltenham twp. (Address Elkins Park)	Frank C. Ketler
Chester	F. Herman Fritz
Clairton	H. D. Teal
Clearfield	S. F. W. Morrison
Clifton Heights	William H. Brown
Coaldale	J. E. Gildea
Coatesville	Carl O. Benner
Collingdale	T. E. Stengle
Columbia	J. B. Kennedy
Connellsville	Bela B. Smith
Conshohocken	Robert C. Landis

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Coraopolis	J. C. Werner
Corry	Ralph S. Dewey
Crafton	E. O. Liggitt
Danville	E. B. Cline
Darby	W. R. Douthett
Dickson City	P. M. Brennan
Donora	John E. Shambach
Dormont	Ralph Radcliffe
Du Bois	R. W. Robinson
Dunmore	J. R. Gilligan
Dupont	Cecile T. Dugan
Duquesne	C. H. Wolford
Duryea	John J. Joyce
Easton	James C. Bay
East Pittsburgh	Charles F. Young
East Stroudsburg	Elmer E. Kuntz
Edwardsville	Victor E. Lewis
Ellwood City	Vaugh R. DeLong
Emaus	H. J. Yeager
Erie	John C. Diehl
Etna	H. G. Norris
Exeter	John B. Campbell
Farrell	W. W. Irwin
Ford City	Quincey G. Vincent
Forest City	Jules J. Kerl
Forty Fort	Rexford J. Noack
Frackville	W. R. Trautman
Franklin	Karl M. Russell
Freeland	N. P. Luckenbill
Gettysburg	L. C. Keefauver
Glassport	John S. Hart
Greensburg	Wm. H. McIlhattan
Greenville	R. D. Welch
Grove City	H. M. B. Lehn
Hanover	C. V. Ershy
Hanover twp.	Edward S. Williams
Harrisburg	Martin H. Thomas
Harrison	M. G. Morris
Haverford	J. Frank Carter
Hazleton	A. D. Thomas
Holidaysburg	Hobson C. Wagner
Homestead	Port Eckles
Honesdale	J. J. Koehler
Huntington	J. G. Everard
Indiana	Norman C. Koontz
Jeanette	E. W. Long
Jersey Shore	I. V. Grugan
Johnstown	Dale D. McMaster
Kane	Glennis H. Rickert
Kingston	J. R. Merkel
Kittanning	Clyde W. Cranmer
Kulpmont	J. A. Shovlin
Lancaster	H. E. Gress
Lansdale	Ralph R. Smith
Lansdowne	S. N. Ewan, Jr.
Lansford	E. M. Balsbaugh
Larksville	Thomas F. Feeney
Latrobe	John G. Hulton
Lebanon	R. R. Abernethy
Lehighton	Bert B. David
Lewistown	D. M. Albright
Lock Haven	J. F. Puderbaugh
Lower Merion twp. (Address Ardmore)	S. Edgar Downs
Luzerne	T. S. Williams
Luzerne twp. (Address South Brownsville)	James J. Pauley
Mahanoy City	H. A. Oday
McAdoo	Sallie L. Ferry
McKeesport	Joseph B. Richey
McKees Rocks	T. K. Johnston
Meadville	Warren P. Norton
Mechanicsburg	R. L. Van Scoten
Media	W. H. Michaels
Middletown	G. W. Feaser
Midland	H. V. Herlinger
Millvale	C. C. Williamson
Milton	Carl L. Millward
Minersville	C. E. Roudabush
Monessen	Samuel Fausold
Monongahela	John H. Dorr
Morrisville	M. R. Reiter
Mount Carmel	G. A. Beierschmitt
Mount Lebanon	Herman C. Grose
Mount Oliver	Minnie Ubinger
Mount Pleasant	J. C. Haberlen
Munhall	Charles R. Stone
Nanticoke	A. P. Diffendafer
Nanty-Glo	C. H. Bowers
Nazareth	F. A. Marcks
New Brighton	S. W. Lyons
New Castle	Clyde C. Green
New Kensington	E. T. Chapman
Norristown	H. O. Dietrich
Northampton	G. A. Eichler
North Braddock	F. D. Zuerner
Oakmont	W. Lee Gilmore
Oil City	R. A. Baum
Old Forge	B. T. Harris
Olyphant	John A. Dempsey
Palmerton	J. N. Roeder
Philadelphia	Edwin C. Broome
Phoenixville	Martin L. Peters
Pitcairn	R. L. Roose
Pittsburgh	Ben G. Graham
Pittston	D. J. Cray
Plains	J. A. McCaa
Plymouth	H. S. Jones
Pottstown	Frank Haiston
Pottsville	L. A. BuDahn
Punxsutawney	F. S. Jackson
Rankin	Frank J. Good
Reading	Thomas Henry Ford
Ridgway	W. M. Pierce
Rochester	Robert P. Barner
St. Clair	Charles R. Birch
St. Marys	J. J. Lynch
Sayre	Horace H. Beach
Schuylkill Haven	Paul S. Christman
Scottdale	S. B. Bulick
Scranton	John H. Dyer
Sewickley	L. H. Conway
Shamokin	P. E. Whitmeyer
Sharon	W. D. Gamble
Sharpsburg	J. J. Donovan
Sharpsville	Harry E. Pebly
Shenandoah	A. J. Ratchford
South Brownsville	Robert Austin
South Williamsport	A. B. Elder
Steelton	Charles S. Davis
Stowe	Gale F. Stroup
Stroudsburg	Robert Brown
Summit Hill	E. T. McCready
Sunbury	C. C. Maderia
Swissvale	C. S. Baily
Swoyerville	Joseph H. Finn
Tamaqua	F. G. Horner
Tarentum	A. D. Endsley
Taylor	W. J. Powell
Throop	John J. O'Hara
Titusville	G. A. Stetson
Turtle Creek	W. A. Rodgers
Tyrone	W. W. Eisenhart
Uniontown	J. N. Mowls
Upper Darby	William C. Sampson
Vandergrift	John R. Kurtz
Warren	J. G. Rossman
Washington	Meyers B. Horner
Waynesboro	D. J. Keener
West Chester	Walter L. Philips
West Hazleton	E. S. Teter
West Pittston	R. J. W. Templin
West View	R. E. McKee
West York	A. H. Martin
Wilkes-Barre	A. E. Bacon
Wilkinsburg	W. C. Graham
Williamsport	A. M. Weaver
Wilmerding	Charles W. Shaffer
Wilson Boro. (Address Easton)	C. E. Furst
Windber	J. W. Hedge
Winton Boro. (Address Jessup)	J. L. McCloskey
York	A. W. Ferguson
Rhode Island	
Barrington	Charles H. Keyes
Bristol	E. S. Mapes
Burrillville	J. C. Sweeney
Central Falls	James E. Martin
Coventry	R. E. E. Campbell
Cranston	John K. Fenner
Cumberland	Emma M. Caufield
East Providence	J. R. D. Oldham
Johnston	Albert A. Thornton
Lincoln	John L. Smith
Newport	Harold T. Lowe
North Providence	James L. McGuire
Pawtucket	William A. Newell
Providence	A. J. Stoddard
South Kingstown	E. K. Wilcox
Warren	Leroy G. Staples
Warwick	Warren A. Sherman
Westerly	Willard H. Bacon
West Warwick	John F. Deering
Woonsocket	James F. Rockett
South Carolina	
Aiken	L. K. Hagood
Anderson	E. C. McCants
Camden	J. G. Richards, Jr.
Charleston	A. B. Rhett
Chester	Myron E. Brockman
Clinton	J. H. Witherspoon
Columbia	A. C. Flora
Darlington	J. C. Daniel
Florence	John W. Moore
Gaffney	W. E. Sawyer
Georgetown	W. C. Bynum
Greenville	J. L. Mann
Greenwood	W. E. Black
Hartsville	J. H. Thornwell
Laurens	C. K. Wright
Newberry	O. B. Cannon
Orangeburg	A. J. Thackson
Rock Hill	R. C. Burts
Spartanburg	L. W. Jenkins
Sumter	S. H. Edmunds
Union	T. C. Jolly, Jr.
South Dakota	
Aberdeen	C. L. Dalthorp
Huron	Andrew J. Lang
Lead	R. V. Hunkins
Mitchell	John C. Lindsey
Rapid City	E. B. Bergquist
Sioux Falls	A. A. MacDonald
Watertown	H. Mackenzie
Yankton	C. A. Beaver
Tennessee	
Alcoa	V. F. Goddard
Athens	J. C. Ridenour
Bristol	Ralph B. Rubins
Chattanooga	W. T. Robinson
Clarksville	C. H. Moore
Cleveland	R. T. Allen
Columbia	R. L. Harris
Dyersburg	C. M. Walker
Elizabethton	E. L. Bowers
Greenville	S. T. Gass
Jackson	C. B. Ijams
Johnson City	Roy G. Biglow
Kingsport	R. N. Robinson
Knoxville	Harry Clark
Memphis	R. L. Jones
Morristown	Carl T. Vance
Murfreesboro	J. C. Mitchell
Nashville	H. F. Srygley
Paris	W. O. Inman
Shelbyville	O. E. Ratcliffe
Springfield	Wilbur S. Young
Union City	J. T. Webb
Texas	
Abilene	R. D. Green
Amarillo	W. A. McIntosh
Austin	A. N. McCallum
Beaumont	M. E. Moore
Big Spring	W. C. Blankenship
Bonham	H. A. Glass
Borger	B. C. Shulkey
Breckenridge	John F. Bailey
Brenham	M. B. Holleman
Brownsville	E. C. Dodd
Brownwood	E. J. Woodward
Bryan	S. M. Brown
Childress	A. W. Adams
Cisco	R. N. Cluck
Cleburne	Emmett Brown
Coleman	C. H. Hufford
Corpus Christi	E. H. Hereford
Corsicana	W. H. Norwood
Dallas	N. R. Crozier
Del Rio	Roy M. Andrews
Denison	F. B. Hughes
Denton	W. T. Daggett
Eagle Pass	B. H. Miller
Electra	B. M. Dinsmore

City	Superintendent
El Paso	A. H. Hughey
Ennis	Newton W. McCann
Fort Worth	W. M. Green
Gainesville	H. O. McCain
Galveston	E. G. Littlejohn
Goose Creek	W. R. Smith
Greenville	J. L. Bergin
Harlingen	E. C. Deering
Highland Park	H. E. Gable
Hillsboro	Loy W. Hartsfield
Houston	E. E. Oberholtzer
Huntsville	C. N. Shaver
Jacksonville	Larue Cox
Kingsville	J. D. Bramlette
Laredo	W. P. Galligan
Longview	Henry L. Foster
Lubbock	K. E. Oberholtyer
Lufkin	I. A. Coston
Luling	R. A. Box
Marlin	H. J. McIlhany
Marshall	J. P. Buck
McAllen	John H. Gregory
McKinney	Jack R. Ryan
Mercedes	Ernest H. Poteet
Mexia	R. M. Hawkins
Midland	W. W. Lackey
Mineral Wells	H. H. Hutto
Mission	H. C. Proctor
Nacogdoches	Rufus E. Price
Navasota	L. G. Andrews
New Braunfels	E. A. Sahm
Orange	E. B. Stover
Palestine	Bonner Frizzell
Pampa	R. B. Fisher
Paris	A. H. Chamness
Plainview	C. E. Davis
Port Arthur	G. M. Simms
Ranger	R. F. Holloway
San Angelo	Felix E. Smith
San Antonio	J. C. Cochran
San Benito	O. L. Davis
San Marcos	L. J. Berry
Seguin	Joe F. Saegert
Sherman	L. T. Cook
Sulphur Springs	W. L. Willis
Sweetwater	B. H. McLain
Taylor	R. H. Brister
Temple	L. C. Procter
Terrell	F. E. Langwith
Texarkana	H. W. Stilwell
Tyler	I. M. Hodges
Uvalde	Guy D. Dean
Vernon	W. T. Lofland
Victoria	V. L. Griffin
Waco	B. B. Cobb
Waxahachie	G. B. Winn
Wichita Falls	H. D. Fillers
Yoakum	G. P. Barron
Utah	
Brigham	Hervin Bunderson (a)
Logan	E. Allen Bateman
Murray	James Clove
Ogden	W. Karl Hopkins
Provo	H. A. Dixon
Salt Lake City	L. John Nuttall, Jr.
Tooele	P. M. Nielsen (a)
Vermont	
Barre	Ralph E. Noble
Bennington	D. W. McClelland
Brattleboro	Florence M. Wellman
Burlington	Lyman C. Hunt
Montpelier	W. A. Kincaid
Newport	E. A. Hamilton
Rockingham	F. M. Malcolm
Rutland	W. W. Fairchild
St. Albans	Josiah S. McCann
St. Johnsbury	S. C. Harding
Winooski	G. R. Stackpole
Virginia	
Alexandria	T. C. Williams
Bristol	Roy B. Bowers
Charlottesville	James G. Johnson
Clifton Forge	Herman Blankinship
Covington	S. T. Godbey (d)
Danville	G. L. H. Johnson
Fredericksburg	G. H. Brown
Hampton	Robert M. Newton
Harrisonburg	W. H. Keister
Hopewell	R. W. Copeland
Lynchburg	Omer Carmichael
Martinsville	E. E. Givens (d)
Newport News	J. H. Saunders
Norfolk	C. W. Mason
Petersburg	Henry G. Ellis
Portsmouth	Harry A. Hunt
Pulaski	E. L. Darst (d)
Radford	W. K. Barnett
Richmond	J. H. Binford
Roanoke	D. E. McQuilkin
South Norfolk	R. H. Pride
Staunton	L. F. Shelburne
Suffolk	John E. Martin
Winchester	G. R. Quarles
Waynesboro	A. C. Gilkeson
Washington	
Aberdeen	C. J. Powell
Anacortes	De Fore Cramblitt
Bellingham	C. Paine Shangle
Bremerton	Tillman Peterson
Centralia	Clyde G. Campbell
Everett	R. E. Cook
Hoquiam	H. C. Crumpacker
Kelso	C. H. Lillie
Longview	E. J. McNamara
Olympia	L. P. Brown
Port Angeles	H. G. Hanbloom
Puyallup	P. B. Hanawalt
Seattle	Worth McClure
Spokane	O. C. Pratt
Tacoma	Elmer L. Breckner
Vancouver	De Garis Reeves
Walla Walla	W. M. Kern
Wenatchee	John W. Goddard
Yakima	A. C. Davis
West Virginia	
Beckley	R. B. Chambers (a)
Bluefield	G. J. Wood (a)
Charleston	Elizabeth J. Goodall (a)
Clarksburg	W. H. Coffindaffer (a)
Elkins	Bryan Hamilton (a)
Fairmont	A. L. Thomas (a)
Grafton	Lloyd L. Shriver (a)
Hinton	Margaret Nicely (a)
Huntington	Henry F. White (a)
Keyser	Luke McDowell (a)
Martinsburg	Bessie D. Kilmer (a)
Morgantown	Floyd B. Cox (a)
Moundsville	S. J. Anderson (a)
Parkersburg	Walter B. Huffman (a)
Princeton	G. J. Wood (a)
Richwood	Shirley Morton (a)
South Charleston	Elizabeth J. Goodall (a)
Welch	N. A. Steadman (a)
Wellsburg	Olen Rutan (a)
Weston	Thomas E. Miles (a)
Wheeling	Z. W. Springer (a)
Williamson	James R. Davis (a)
Wisconsin	
Antigo	P. A. Tipler
Appleton	Ben J. Rohan
Ashland	I. O. Hubbard
Baraboo	A. C. Kingsford
Beaver Dam	A. H. Luedke
Beloit	D. F. Rice
Chippewa Falls	Robert F. Lohrie
Cudahy	J. R. Brandsmark
De Pere	T. J. McGlynn
Eau Claire	Alvin T. Stolen
Fond du Lac	L. P. Goodrich
Fort Atkinson	Frank C. Bray
Green Bay	H. F. Sutton
Janesville	L. R. Creutz
Kaukauna	J. F. Cavanaugh
Kenosha	G. F. Loomis
La Crosse	G. M. Wiley
Madison	R. W. Bardwell
Manitowoc	Hugh S. Bonar
Marinette	G. E. Denman
Marshfield	R. F. Lewis
Menasha	J. E. Kitowski
Menomonie	W. G. Ballentine
Merrill	George F. Brooks
Milwaukee	M. C. Potter
Monroe	E. O. Evans
Neenah	C. F. Hedges
Oconto	L. W. Fulton
Oshkosh	Charles C. Bishop
Portage	A. J. Henkel
Racine	Wm. C. Giese
Rhinelander	W. F. Kruschke
Rice Lake	W. F. Waterpool
Sheboygan	H. E. Smith
Shorewood	H. S. Hemenway
South Milwaukee	John P. Mann
Stevens Point	P. M. Vincent
Superior	W. R. Davies
Two Rivers	Fred G. Bishop
Watertown	R. A. Buell
Waukesha	G. O. Banting
Waupun	H. C. Wegner
Wausau	E. C. Hirsch
Wauwatosa	W. T. Darling
West Allis	H. B. Nash
Whitefish Bay	C. L. Mulrine
Wisconsin Rapids	A. R. Page
Wyoming	
Casper	R. S. Hicks
Cheyenne	A. S. Jessup
Laramie	A. A. Slade
Rock Springs	E. M. Thompson
Sheridan	J. J. Early

REFERENCES

(a) County superintendent. (b) Parish superintendent.

Section XI

ARCHITECTS
FOR EDUCATIONAL BUILDINGS

All the architects listed in this Directory are now at work on educational buildings or have designed a number of school and college buildings in recent years.

No attempt has been made to evaluate the skill or professional standing of the architects listed. Boards of Education and persons interested in the construction of new buildings can obtain valuable advice in this matter from the presidents of the local chapters of the American Institute of Architects, or from the national headquarters of that organization, The Octagon, Washington, D. C., and from such sources as the National Advisory Council on School Buildings, the United States Office of Education, the respective state departments of education, the Department of Education of the National Catholic Welfare Conference, and the Department of Educational Administration of Teachers College, Columbia University, New York.

ALABAMA

Birmingham
Charles H. McCauley, Jackson Bldg.
Miller & Martin, Archts., and J. A. Lewis, Engr., Title Guarantee Bldg.
Bem Price, 611-12 Farley Bldg.
W. A. Rayfield & Co., 328 St. George St.
Jack B. Smith, Steiner Bank Bldg.
E. B. Van Keuren, Inc., 501-2-3 Farley Bldg.
Warren, Knight & Davis, 700 Protective Life Bldg.
William Leslie Welton, 19th Floor Webb Crawford Bldg.

Gadsden
A. Duncan Simpson, Broad St.

Mobile
George B. Rogers, 1007 Van Antwerp Bldg.

Montgomery
A. F. Dittmar, State Dept. of Education
Moreland Griffith Smith, 1305 S. Perry St.

ARIZONA

Phoenix
L. M. Fitzhugh, 329 Ellis Bldg.
Lescher & Mahoney, 1100 Title & Trust Bldg.
Wallingford & Bell, Heard Bldg.

Tuscon
Roy W. Place, 11 E. Pennington St.

ARKANSAS

Fort Smith
Bassham & Wheeler, 212 Kennedy Bldg.
Haralson & Nelson, 427 Merchants National Bank Bldg.

Little Rock
John P. Almand, 324 W. 14th St.
H. Ray Burks, 702 Wallace Bldg.
Erhart & Eichenbaum, 204 Gem Bldg.
A. N. McAninch, 602 Pyramid Bldg.
Mann, Wanger & King, 1316 Donaghey Bldg.
Eugene John Stern, National Standard Bldg.
Wittenberg & Delony, 807 Southern Bldg.

CALIFORNIA

Bakersfield
Charles Biggar, 554 Haberfelde Bldg.
Clarence Cullimore, 101 Oleander Ave.

Balboa Island
Donald Beach Kirby

Berkeley
John J. Donovan, 950 Parker St.
W. H. Ratcliff, American Trust Co. Bldg.

Chico
Chester Cole

Fresno
Swartz & Ryland

Healdsburg
John I. Easterly, 302 Grant St.

Long Beach
Clarence N. Aldrich, 1834 Dawson Ave.
Dedrick & Bobbe, 901 Heartwell Bldg.
Gentry & Haynes, 521 Jergins Trust Bldg.
D. Easton Herrald, 732 Pine Ave.
Edward L. Mayberry, 3910 E. 3rd St.
Roger K. Nissen, 501 Termino Ave.
Martin C. Parker, 1071 E. Broadway
Victor E. Siebert, 120 E. 2nd St.
Kenneth S. Wing, 501 Termino Ave.

Los Angeles
Richard M. Bates, Jr., 5333 Delaware Ave.
Edwin Bergstrom, 1129 Citizens National Bank Bldg.
Horatio W. Bishop, 901 S. Wilton Pl.
Paul J. Duncan, 624 S. La Brea St.
Ralph C. Flewelling, 816 W. 5th St.
Gable & Wyant, 3723 Wilshire Blvd.
Myron Hunt & H. C. Chambers, 408 S. Spring St.
Arthur R. Hutchason, 816 W. 6th St.
Office of Gordon B. Kaufmann, 610 Union Bank Bldg.
T. C. Kistner & Co., 814 Architects Bldg.
Krempel & Erkes, 1211 Rives-Strohg Bldg.
Samuel E. Lunden, 400 Rowan Bldg.
Marsh, Smith & Powell, 516 Architects Bldg.
Armand Monaco, 448 S. Hill St.
H. C. Newton & R. D. Murray, 502 Architects Bldg.
Parkinson & Parkinson, 433 S. Spring St.
Alfred W. Rea & Chas. E. Garstang, 907 Pacific Southwest Bank Bldg.
Winchton Leamon Risley, 220 S. Westmoreland Ave.
A. F. Rosenheim, 608 Chamber of Commerce Bldg.
Frank R. Schaefer, 560 S. Main St.
Eugene Weston, Jr., 502 Architects Bldg.
Carleton Monroe Winslow, 1001 Architects Bldg.
Henry F. Withey, 407 S. Western Ave.

Monterey
C. J. Ryland, P. O. Box 790

Oakland
Will G. Corlett, 1801 Bank of America Bldg.
Miller & Warnecke, Financial Center Bldg.

Palo Alto
B. M. Clark & David B. Clark, 310 University Ave.

Pasadena
Ernest Crimi, 93 S. Grand Oaks
Frederick Kennedy, Jr., 1041 E. Green St.
Marston & Maybury, 25 S. Euclid Ave.

Rancho Santa Fe
Lillian J. Rice

Riverside
G. Stanley Wilson, 3616 Main St.

Sacramento
George C. Sellon, California State Life Bldg.

San Bernardino
H. E. Jones, 505 Andreson Bldg.

San Diego
Louis J. Gill, Sefton Bldg., Suite 32
William P. Lodge, California Bank Bldg.
John S. Siebert, 311 Granger Bldg.
F. W. Stevenson, Spreckels Bldg.

San Francisco
Arthur Brown, Jr., 251 Kearny St.
Norman R. Coulter, 46 Kearny St.
Edward A. Eames, 353 Sacramento St.
William C. Hays, 1 Montgomery St.
Samuel Lightner Hyman & A. Appleton, 68 Post St.
G. Albert Lansburgh, 140 Montgomery St.
Maybeck & White, 235 Montgomery St.
William Mooser, 681 Market St.
Julia Morgan, 1135 Merchants Exchange
E. L. Norberg, 580 Market St.
John Reid, Jr., 405 Montgomery St.
Frederick H. Reimers, 233 Post St.
Resing & McGuinness, 488 Pine St.
Martin Rist, 944 Phelan Bldg.
Albert F. Roller, 1301 Crocker First Nat. Bank Bldg.
Chas. F. Strothoff, 2274 15th St.
Ward & Blohme, 24 California St.
William H. & Harold H. Weeks, 525 Market St.

San Gabriel
Scott Quintin, 418 N. California St.

San Jose
Ralph Wyckoff, San Jose National Bank Bldg.

San Leandro
Mark Daniels, Ferncliff

Santa Ana
Frederick H. Eley, 109 Orange Ave.

Santa Barbara
E. Keith Lockard, 117 E. De La Guerra St.
Winsor Soule & John Frederic Murphy, 116 E. Solo St.

South Pasadena
A. S. Nibecker, Jr., 1624 Bushnell Ave.

Stockton
Frank V. Mayo, 931 N. Eldorado St.

Ventura
Harold E. Burket, 455 E. Main St.

COLORADO

Denver
William N. Bowman, 612 Insurance Bldg.
T. H. Buell & Company, 1032 U. S. Nat. Bank Bldg.
H. W. J. Edbrooke, 512 Tabor Bldg.
William E. & Arthur A. Fisher, 827 Denver National Bldg.
Robert K. Fuller, 503 Insurance Bldg.
Eugene G. Groves, 2047 Champa St.
G. Meredith Musick, 204 Republic Bldg.
Gordon D. White, 615 Columbine St.
George H. Williamson, 335 Majestic Bldg.

Montrose
J. H. Antrobus, 634 Main St.

Pueblo
Walter DeMordaunt, 738 Thatcher Bldg.

Trinidad
Francis W. Spencer & Roy W. Vorhees

CONNECTICUT

Bridgeport
Frederick H. Beckwith, 19 Arcade Balcony
Ernest G. Southey, 955 Main St.
Charles Wellington Walker, 1115 Main St.

Hartford
Isaac A. Allen & Son, Inc., 100 Farmington Ave.
S. W. Haynes & Asso., 36 Pearl St.
Carl J. Malmfeldt, Adams & Prentice Asso., 36 Pearl St
William T. Marchant, 36 Pearl St.
Mylchreest & Reynolds, 238 Palm St.
Lester Beach Scheide, Inc., 36 Pearl St.
Frank Warren Whiton, 805 Main St.

Meriden
Office of Lorenzo Hamilton, Inc., 22 Church St.

Middletown
Towner & Sellew Asso., Inc., 329 Main St.

New Britain
Delbert K. Perry & Earle K. Bishop, 17 Court St.

New Haven
Brown & Von Beren, 295 Sherman Ave.
R. W. Foote, 185 Church St.
Kelly & Kelly, 185 Church St.
Douglas Orr, 956 Chapel St.

New London
A. Graham Creighton, 140 State St.

Old Lyme
Thomas Raymond Ball

Stamford
William J. Provoost, 33 Atlantic St.

Waterbury
Louis A. Walsh, 69 Center St.

DELAWARE

Wilmington
Brown & Whiteside, Architects, Inc., 2162 du Pont Bldg.
E. W. Martin, du Pont Bldg.
Massena and du Pont, 921 Market St.
Robinson, Stanhope & Manning, 503 Equitable Bldg.

DISTRICT OF COLUMBIA

Washington
Albert I. Cassell, Howard University
Donald S. Johnson, 726 Jackson Pl.
Brown Rolston, 1548 44th St., N. W.
A. B. Trowbridge, 917 15th St.
Upman & Adams, 744 Jackson Pl., N. W.

FLORIDA

Daytona Beach
Harry M. Griffin, 309 N. Grandview Ave.

Gainesville
Rudolph Weaver, University of Florida

Jacksonville
Mellen C. Greeley, 218 W. Adams St.
Mark & Sheftall, 312 Clark Bldg.
Jefferson D. Powell, 601 Professional Bldg.

Miami
Kiehnel & Elliott, 930 Seybold Bldg.
E. L. Robertson, 602 News Tower

Miami Beach
August Geiger, 731 Lincoln Rd.

Pensacola
S. J. Welch, 1110 E. Jackson St.

St. Petersburg
Henry L. Taylor, Empire Bldg.

Stuart
Bert D. Keck, 406 Camden Ave.

Tampa
Frank A. Winn, Jr., 416 Tampa St.

GEORGIA

Atlanta
Bush-Brown, Gailey & Associates, Department of Architecture, Georgia State School of Technology
Wm. J. J. Chase, 140 Peachtree St.
Daniell & Beutell, Georgia Savings Bank Bldg.
Edwards & Sayward, 101 Marietta St. Bldg.
Hentz, Adler & Shutze, 1330 Candler Bldg.
Ivey & Crook, Candler Bldg.
Arthur Neal Robinson, 407 Henry Grady Bldg.
Tucker & Howe, 1711 Rhodes Haverty Bldg.

Augusta
F. Arthur Hazard, 228 Masonic Bldg.
Willis Irvin, 617-20 S. F. C. Bldg.

Brunswick
Francis L. Abreu, Perry Bldg.

Macon
Dennis & Dennis, 556 Mulberry St.

Rome
R. L. Townsend, P. O. Box 366

Savannah
Cletus W. Bergen, 1013 Liberty National Bank Bldg.

Valdosta
Lloyd Greer, 108 S. Patterson St.

IDAHO

Pocatello
Frank H. Paradice, Jr., 219 Portneuf Bldg.

ILLINOIS

Alton
L. Pfeiffenberger's Sons, 102 W. 3rd St.

Aurora
Frank B. Gray, 73 S. LaSalle St.

Belleville
O. W. Rubach, Belleville Bank & Trust Bldg.

Bloomington
Lundeen & Roozen, 603 Corn Belt Bank Bldg.
Schaeffer & Hooton, 710 Peoples Bank Bldg.

Champaign
F. E. Berger & R. L. Kelley, 44 Main St.
George E. Ramey, 415 Robeson Bldg.

Chicago
Ralph E. Abell Co., 176 W. Adams St.
Armstrong, Furst & Tilton, 11 S. LaSalle St.
Ashby, Ashby & Schulze, 1511 W. Jackson Blvd.
Herbert A. Brand, 400 W. Madison St.
Burnham Brothers & Hammond, Inc., 160 N. LaSalle St.
Childs & Smith, 430 N. Michigan Ave.
John C. Christensen, Room 510, 228 N. LaSalle St.
John D. Chubb, 109 N. Dearborn St.
Edwin H. Clark, Inc., 8 East Huron St.
Floyd E. Dougherty, 79 W. Monroe St.
N. Max Dunning, 306 Wabash Ave.
George G. Elmslie, 122 S. Michigan Ave.
Leonard A. Gliatto, 5748 Race Ave.
Granger & Bollenbacher, 333 N. Michigan Ave.
Stanley Worth Hahn, 605 N. Michigan Ave.
Hamilton, Fellows & Nedved, 814 Tower Court
Charles Hodgdon & Son, 111 West Monroe St.
Holmes & Flinn, 8 S. Dearborn St.
Holsman & Holsman, 140 S. Dearborn St.
Denison B. Hull, 77 W. Washington St.
Joseph C. Llewellyn Co., 38 S. Dearborn St.
McNally & Quinn, 10 S. LaSalle St.
Benj. Franklin Olson, 19 S. LaSalle St.
Pond & Pond & Edgar Martin, 180 N. Michigan Ave.
J. E. O. Pridmore, 5959 Winthrop Ave.
James B. Rezny & Adrian Rezny, 2202 S. Crawford Ave.
Ivan H. Riley & Company, 203 N. Wabash Ave.
E. E. Roberts & Elmer C. Roberts, Inc., 82 W. Washington St.
Monroe R. Sandel, 10 E. Huron St.
Schmidt, Garden & Erikson, 104 S. Michigan Ave.
R. Harold Zook, 140 S. Dearborn St.

Decatur
Brooks, Bramhall & Dague, 254 E. Main St.

East St. Louis
John W. Kennedy, 306-7 First Nat. Bank Bldg.

Evanston
Arthur Howell Knox, 1135 Oak Ave.
Dwight H. Perkins, 2319 Lincoln St.

Galesburg
Aldrich & Aldrich, 700 Bondi Bldg.
Edgar A. Payne, 260 S. Seminary St.

Highland
Knoebel & Pabst, State & Trust Bank Bldg.

Lake Forest
Anderson & Ticknor, Inc., 262 E. Deerpath Ave.

Lincoln
Deal & Ginzel, I. O. O. F. Bldg.

Metropolis
S. Lester Daly, 605 Ferry St.

Moline
M. R. Beckstrom, 2129 16th St.
William H. Schulzke, 1630 Fifth Ave.

Ottawa
John Hanifen

Peoria
Hamilton B. Dox, 502 Lehmann Bldg.
Hewitt, Emerson & Gregg, 1600 Peoria Life Bldg.
Jameson & Harrison, Peoria Life Bldg.

Ravinia
John S. Van Bergen

Rockford
Peterson & Johnson, 406 Swedish-American Bank

Rock Island
Cervin & Stuhr, 310 Safety Bldg.
Benj. A. Horn, Rock Island Bank Bldg.
Ed. Lerch, 2211 26th St.

Springfield
Harry J. Reiger, Security Bldg.

Urbana
Royer, Danely & Smith, Flatiron Bldg.

INDIANA

Bedford
O. L. Hill, Box 274

Crawfordsville
Carroll O. Beeson, 220 Ben Hur Bldg.

East Chicago
Karl D. Norris, 205 Calumet Bldg.

Evansville
Harry E. Boyle & Co.

Fort Wayne
Le Roy Bradley, 221 W. Wayne St.

Goshen
Hubert Miller, 503 S. Main St.

Huntington
Robert W. Stevens

Indianapolis
D. A. Bohlen & Son, 1001 Majestic Bldg.
Everett I. Brown, 957 W. Drive, Woodruff
Charles H. Byfield, 928 Peoples Bank Bldg.
Robt. F. Daggett, 922 Continental Bank Bldg.
Herbert Foltz & Son, Architects Bldg.
Norman H. Hill, 1050 N. Delaware St.
J. Edwin Kopf & Deery, Indiana Pythian Bldg.
McGuire & Shook, 1400 Fletcher Trust Bldg.
Parker & Faulstich, 501 Board of Trade Bldg.
Pierre & Wright, 909 Architects Bldg.

Lafayette
Frank P. Riedel, 716 S. 12th St.

Richmond
Werking & Son, 2000 E. Main St.

South Bend
Austin & Shambleau, 1200 Bldg. Loan Tower
W. M. Ellwood, 215 N. Scott St.
Callix E. Miller, 211 Union Trust Bldg.
Ernest W. Young, 807 Sherland Bldg.

Terre Haute
Miller & Yeager, 200 Opera House Bldg.

Treviac
Alfred Grindle, The Beeches

Vincennes
Sutton & Routt, Citizens Trust Bldg.

IOWA

Cedar Rapids
Wm. J. Brown, 719 Higley Bldg.
Norman Hatton, 829 Higley Bldg.
H. E. Hunter, 603 Security Bldg.

Council Bluffs
J. Chris Jensen, 305 Broadway

Davenport
Kruse & Klein, 910 Kahl Bldg.
Seth J. Temple, Union Bank Bldg.

Decorah
Charles Altfillisch, 117 Winnebago St.

Des Moines
Dougher, Rich & Woodburn, 310 Old Colony Bldg.
Keffer & Jones, 202 Masonic Temple
Oren Thomas, 732 Des Moines Bldg.
Tinsley, McBroom & Higgins, 703 Hubbell Bldg.
Wetherell & Harrison, 506 Shops Bldg.

Forest City
Thorwald Thorson

Fort Dodge
Frank W. Griffith, 214 Snell Bldg.

Fort Madison
Robin B. Carswell, 825 Ave. D

Sioux City
Beuttler & Arnold, 405 Insurance Exchange Bldg.
Geo. B. Hilgers, 502 United Bank Bldg.
E. R. Swanson, 505-7 Insurance Exchange Bldg.

Waterloo
Mortimer B. Cleveland, 424 E. 4th St.

KANSAS

Emporia
Brinkman & Hagan, 513 Citizens Bank Bldg.

Hutchinson
Mann & Company, 721 Rorabaugh-Wiley Bldg.
Routledge & Hertz

Kansas City
Peterson & Almon, 721 Minn. Ave.
Jos. W. Radotinsky, 702 Commercial Nat. Bank

Lawrence
Thomas Larrick, 816½ Mass. Ave.

Manhattan
Paul Weigel, Dept. of Architecture, Kansas State College

Newton
M. R. Stauffer, 300 W. 4th St.

Salina
Charles W. Shaver, 828 United Life Bldg.

Topeka
Raymond A. Coolidge, State Architect, State Capital
Cuthbert & Suehrk, 735 Kansas Ave.
W. E. Glover, 301 Nat. Reserve Bldg.
Ralph E. Scamell, 511 Nat. Reserve Bldg.
Thomas W. Williamson, 1202 Nat. Bank of Topeka Bldg.

Wichita
Ed. Forsblom, Central Bldg.
Overend & Boucher, 400 Brown Bldg.
Glen H. Thomas, 125½ N. Topeka Ave.
S. S. Voight, 522 S. Broadway

KENTUCKY

Lexington
H. A. Churchill & John T. Gillig, Walton Bldg.
Hugh Meriwether, Walton Bldg.

Louisville
D. X. Murphy & Bro., 707 Louisville Trust Bldg.
Arthur G. Tafel, 140 S. 3rd St.

Owensboro
C. W. Kimberlin, 327 Frederica St.

LOUISIANA

Alexandria
C. Errol Barron, 10 Haas Bldg.
Herman J. Duncan & Co., Inc., Masonic Drive
Charles T. Roberts, Commercial Bank Bldg.

New Orleans
Armstrong & Koch, 604 Audubon Bldg.
William R. Burk, 401 Vincent Bldg.
Favrot & Reed, 402 Nola Bldg.
Moise H. Goldstein, 812 American Bank Bldg.
Wogan & Bernard, 724 Canal Bank Bldg.

MAINE

Bangor
Crowell & Lancaster, 6 State St.

Lewiston
Harry S. Coombs & Alonzo J. Harriman, 11 Lisbon St.

Portland
Miller & Beal, Inc., 465 Congress St.
John Calvin & John Howard Stevens, 477 Congress St.

MARYLAND

Baltimore
J. A. Ahlers, 529 N. Charles St.
Buckler & Fenhagen, 325 N. Charles St.
William W. Emmart, 801 Union Trust Bldg.
W. H. Emory, Jr., W. Biddle St. at Charles
Clyde N. Friz & Nelson Friz, 2010 Lexington Bldg.
Lucien E. D. Gaudreau, 9 E. Hamilton St.
George F. Hammond, 6407 Pinehurst Rd.
Herbert G. Jory, 1114 Munsey Bldg.
Hugh I. Kavanagh, 913 N. Calvert St.
Henry G. Perring, 10 W. Chase St.
Taylor & Fisher, 2604 Baltimore Trust Bldg.
Lucius R. White, Jr., 10 W. Chase St.
Wyatt & Nolting, 1012 Keyser Bldg.

Chevy Chase
Russell Edw. Mitchell, 7 E. Melrose St.

Silver Spring
Laurence P. Johnston, 822 Sligo Ave.

MASSACHUSETTS

Boston
Allen, Collens & Willis, 75 Newbury St.
J. W. Ames & E. S. Dodge, 148 State St.
Andrews, Jones, Biscoe & Whitmore, 50 Congress St.
J. Williams Beal, Sons, 185 Devonshire St.
William B. Colleary, 80 Boylston St.
Coolidge & Carlson, 89 State St.
Coolidge, Shepley, Bulfinch & Abbott, 122 Ames Bldg
Frank Irving Cooper Corp., 47 Winter St.
Cram & Ferguson, 248 Boylston St.
Ralph Harrington Doane, 60 Batterymarch St.
M. A. Dyer Company, 1 Beacon St.
Frohman, Robb & Little, 250 Stuart St.
Harper & West, 131 State St.
J. P. Heffernan, 131 State St.
Henry & Richmond, 12 West St.
Ralph Coolidge Henry, 11 Beacon St.
Hutchins & French, 11 Beacon St.
R. T. Jackson, 44 School St.
Kendall Taylor & Company, 209 Columbus Ave.
Kilham, Hopkins & Greeley, 126 Newbury St.
Edmund I. Leeds, Harrison Ave.
J. D. Leland & Company, 814 Statler Bldg.
McLaughlin & Burr, 88 Tremont St.
Maginnis & Walsh, Statler Bldg.
Maurice P. Meade, 80 Boylston St.
Benjamin Proctor, Jr., 173 Milk St.
Putnam & Cox, 114 State St.
George H. Sidebottom, 137 Newbury St.
Sturgis Associates, Inc., 120 Boylston St.
Matthew Sullivan, Colonial Bldg.
Walker & Walker, 100 Arlington St.

Egypt
Edward I. Wilson, Tilden Rd.

Fall River
Edward M. Corbett, 49 Purchase St.

Haverhill
Morse, Dickinson & Goodwin, 25 Washington Sq.

Lawrence
J. G. Morrisette, 575 A Essex St.

Leominster
Harold E. Mason, 15 Prospect St.

Lynn
Herbert Weed, 38 Exchange St.

New Bedford
Brown & Poole, 688 Pleasant St.
William Tallman, 222 Union St.

Springfield
D. R. Baribault, 1562 Main St.
Jno. W. Donohue, 1200 Main St., Suite 609
Gardner & King, 33 Lyman St.

Wellesley
William H. Brainerd, 10 Upland Rd.

Westfield
Malcolm B. Harding, 8 Main St.

West Springfield
Paul Beekman Johnson, 35 Memorial Ave.

Worcester
Edwin T. Chapin, 311 Main St.
Frost, Chamberlain & Edwards, 390 Main St.
Harry L. Meacham Associates, 120 Front St.
O. E. Nault & Sons, 48 Hamilton St.
Jasper Rustigian, 16 Norwich St.

MICHIGAN

Ann Arbor
Fry & Kasurin, 901 First Nat. Bank Bldg.

Battle Creek
Lewis J. Sarvis, Bromberg Bldg.

Bay City
Joseph C. Goddeyne, Bay City Bank Bldg.

Bloomfield Hills
J. Robert F. Swanson

Detroit
Robert O. Derrick, Inc., 3500 Union Guardian Bldg.
J. Ivan Dise, 2631 Woodward Ave.
Donaldson & Meier, 1601 Washington Blvd. Bldg.
George J. Haas, 601 E. Grand Blvd.
Aloys Frank Herman, Inc., 710 Owen Bldg.
Austin A. Howe, 144 N. Marlborough St.
Arthur K. Hyde, 318 Woodward-Boulevard Bldg.
Albert Kahn, Inc., New Center Bldg.
Louis Kamper, Inc., 1510 Book Tower Bldg.
H. T. Keyes, 748 Free Press Bldg.
Lane-Davenport, Inc., 609-10 Donovan Bldg.
McGrath & Dohmen, 3648 Mt. Elliott
Malcomson & Higginbotham, 1217 Griswold St.
George D. Mason & Co., 409 Griswold St.
C. William Palmer, 120 Madison Ave.
Smith, Hinchman & Grylls, 800 Marquette Bldg.
B. C. Wetzel & Company, 2317 Dime Bank Bldg.

Flint
George Bachman, 1819 Magnolia St.

Grand Rapids
Harry L. Mead, 901 Michigan Trust Bldg.
Victor E. Thebaud, 208 Grand Rapids Bank Bldg.
Henry H. Turner, Murray Bldg.

Kalamazoo
M. C. J. Billingham, 211 Woodward Ave.
LeRoy & Newlander, 122 Pratt Block

Lansing
Warren S. Holmes Co., 2100 Olds Tower Bldg.

Port Huron
Walter H. Wyeth, 323 United States Bank Bldg.

Royal Oak
Frederick D. Madison, 258 Washington Square Bldg.

Saginaw
Samuel Allen, 206 Eddy Bldg.
Cowles & Mutscheller, 240 Goff Bldg.
Frantz & Spence, 118 N. Washington Ave.

Scottville
A. H. Ellwood & Son

Ypsilanti
R. S. Gerganoff, 206 N. Washington St.

MINNESOTA

Duluth
C. H. Smith, 909 Torrey Bldg.

Hibbing
J. C. Taylor, 313½ E. Howard St.

Mankato
Pass & Rockey, 124 E. Jackson St.

Minneapolis
Croft & Boerner, 1004 Marquette Ave.
Lang & Raugland, 412 Essex Bldg.
William K. Macomber Inc., 808 Lasalle Ave.
Stebbins, Haxby & Bissell, 1111 Nicollet Ave.
Sund & Dunham, 514 Essex Bldg.

St. Cloud
Nairne W. Fisher, St. Mary's Bldg.
Louis Pinault, 401 Granite Exchange Bldg.

St. Paul
Alban & Olson, 885 Portland Ave.
Thomas F. Ellerbe & Company, 1100 Minnesota Bldg.
William M. Ingemann, 308 Globe Bldg.
Clarence H. Johnston, 360 Robert Street Bldg.
Toltz, King & Day, 1509 Pioneer Bldg.

Winona
Boyum, Schubert & Sorenson, 117 W. 3rd St.

MISSISSIPPI

Gulfport
Vinson B. Smith, Jr., 500 Hewes Bldg.

Jackson
Frank P. Gates Company, Millsaps Bldg.
C. H. Lindsley & E. L. Malvaney, Tower Bldg.
J. M. Spain, Merchants Bank Bldg.

Meridian
Krouse & Brasfield, 204 Kidder Bldg.

MISSOURI

Cape Girardeau
A. F. Lindsay, 424 H. & H. Bldg.

Kansas City
Samuel W. Bihr, Jr., 220 E. Winthrope Rd.
Ernest O. Brostrom, 3725 Valentine Rd.
Maurice Carroll, 3120 Karnes Blvd.
Greenebaum, Hardy & Schumacher, 410 Scarritt Arcade
Edgar P. Madorie, 206 Westover Rd.
H. D. Pampel, 304 Finance Bldg.
Sayler & Owen, 830 Exchange Bldg.
Chas. A. Smith, 800 Finance Bldg.
Wight & Wight, 14 West 10th St.

Moberly
Ludwig Abt, Riegel Bldg.

St. Joseph
Eckel & Aldrich, 1105 Corby Bldg.
Eugene R. Meier, 231 Bartlett Trust Bldg.

St. Louis
Bonsack & Pearce, Inc., 411 Olive St.
Marcel Boulicault, 1101 Ambassador Bldg.
Ernest T. Friton, Commissioner of School Bldgs., Board of Education
Hellmuth & Hellmuth, Commercial Bldg.
Jamieson & Spearl, 1103 Arcade Bldg.
Johnson & Maack, 1003-04 Chemical Bldg.
La Beume & Klein, 315 N. 7th St.
F. A. Ludewig Company,, 4921 S. Kings Highway
J. Hal Lynch & Son, 150 N. Bemiston St., Clayton
O'Meara, Hills & G. C. Quick Associate, 5709 Waterman Blvd.
Study & Farrar, 1367 Arcade Bldg.

Springfield
Dan R. Sandford, 1362 Benton Ave.

Webster Groves
Arthur J. Widmer & Associates, Inc., 330 W. Lockwood

MONTANA

Billings
Messrs. McIver & Cohagen, Box 2100
William H. Reid, Jr., 604 N. 31st St.

Butte
Floyd A. Hamill, 404 Lewisohn Bldg.

Great Falls
Bird & van Teylingen, Medical Arts Bldg.
Geo. H. Shanley, First Nat. Bank

Helena
Hugenin & DeKay, 440 N. Benton Ave.

Kalispell
Fred. A. Brinkman, Whipps Block

Missoula
H. E. Kirkemo, Lehsou Block

NEBRASKA

Fremont
George Grabe, 304 E. 6th St.

Grand Island
Gordon Shattuck, Clinic Bldg.

Hastings
K. H. Gedney Company, 851 N. Lincoln Ave

Kearney
J. P. Helleberg, Central Ave.
Hugh M. McClure, 1806 Central Ave.

Lincoln
Davis & Wilson, 525 S. 13th St.
Meginnis & Schaumberg, 614 Federal Trust Bldg.
J. F. Reynolds, 1637 S. 11th St.

Norfolk
James C. Stitt, 15 & 16 Norfolk Nat. Bank Bldg.

Omaha
N. R. Brigham, 607 Keeline Bldg.
Everett S. Dodds, 5011 N. 22nd St.
John Latenser & Sons, Insurance Bldg.
James M. Nachtigall, 512 Paxton Block

Scottsbluff
E. L. Goldsmith & Co., Weller Bldg.

NEVADA

Las Vegas
A. L. Worswick, 115 Carson St.

Reno
F. J. DeLongchamps, Gazette Bldg.

NEW HAMPSHIRE

Concord
Harold Holmes Owen, Inc., 3 N. State St.

Durham
E. T. Huddleston, University of New Hampshire

Enfield
William C. Hough, P. O. Box 333

Hanover
Jens Fredrick Larson, 27 E. Wheelock St.
Wells, Hudson & Granger

NEW JERSEY

Bloomfield
Henry Baechlin, 8 Berkeley Heights Park

Camden
Byron H. Edwards, Inc., 300 Broadway
F. Herbert Radey, 728 Cooper St.

Cliffside Park
Lucht & Anderson, 432 Palisade Ave.

Elizabeth
L. M. Dennis, 333 N. Broad St.
Poggi & Bragdon, 275 Morris Ave.

Englewood
Lawrence C. Licht, 19 Knickerbocker Rd.

Fairlawn
Samuel F. Swales, 8 Burnham Pl.

Fort Lee
Hacker & Hacker

Hackensack
Arthur E. Dore, 398 Main St.

Hasbrouck Heights
George F. Bial, 241 Bell Ave.

Irvington
Victor H. Strombach, Studio Bldg.

Jersey City
Hugh A. Kelly, 921 Bergen Ave.
William Newman & Sons, 587 Summit Ave.

Morristown
Walter Slifer, 10 Park Pl.

Newark
Neil J. Convery, 32 Walnut St.
J. Frederick Cook, 15 Clinton St.
Frank Grad & Son, Inc., Lefcourt Bldg.
Guilbert & Betelle, Chamber of Commerce Bldg.

Palisade
Ernest Sibley, Edgewood Lane

Passaic
Kelly & Struyk, 157 Prospect St.

Paterson
Henry B. Crosby, 1 Crosby Pl.
Fanning & Shaw, 49 Ward St.
Lee & Hewitt, 152 Market St.

Perth Amboy
John Noble Pierson & Son, 313 State St.

Red Bank
Vincent J. Eck, Zobel Bldg.

Ridgefield
Watson & Licht, 19 Van Cortland Pl.

Teaneck
John H. Liebau, 191 Larch Ave.
B. Francis McGuire, 705 Linden Ave.

Trenton
Hill & Brennfleck, 532 Broad Street Bank Bldg.
William A. Klemann Co. & Louis S. Kaplan, 33 W. State St.

Union
Fred A. Elsasser, Settlers Bldg.

NEW MEXICO

Carlsbad
W. L. McAtee & Co., P. O. Box 853

NEW YORK

Albany
H. O. Fullerton, 111 State St.
Galen H. Nichols, 93 State St.
Pember & Demers, 24 James St.
Marcus T. Reynolds, 100 State St.
Alexander Selkirk, 11 N. Pearl St.
Thomas L. Gleason, 98 Chestnut St.
J. Russell White, 109 State St.

Amsterdam
Howard F. Daly, 15 E. Main St.
Leland Henry Niles, 365 Guy Park Ave.

Auburn
Hillger & Beardsley, Seward Block

Binghamton
Conrad & Cummings, 99 Collier St.
A. T. Lacey & Son, 52 Exchange St.
Walter H. Whitlock, 609 Chenango St.

Brooklyn
F. J. Berlenbach & Sons, 191 Joralemon St.
Henry V. Murphy, 208 Livingston St.

Buffalo
Frederick Backus, 360 Delaware Ave.
Bley & Lyman, 505 Delaware Ave.
Dietel & Wade, 250 Delaware Ave.
Edward B. Green, 1 Niagara Sq.
Harbach & Kideney, 259 Delaware Ave.
Hudson & Hudson, 34 Dun Bldg.
F. J. & W. A. Kidd, 524 Franklin St.
D. G. McNeil, 816 City Hall
Roswell E. Pfohl, 204 W. Huron St.
Herbert C. Swain, 227 Oxford Ave.

Cohoes
James A. Galvin, 5 King St., N. S.

Cooperstown
Frank P. Whiting

Cortland
Carl W. Clark, State Theatre Bldg.

Elmira
Pierce & Bickford, 215 W. Water St.

Glens Falls
Milton Lee Crandall, 200 Glenn St.

Gloversville
W. Brown Van Dreser, 31 W. Fulton St.

Harrison
Robert P. Vignola, 231 Harrison Ave.

Hempstead
Edward Hahn
W. F. McCulloch & M. R. Johnke, Asso., 250 Fulton Ave.

Hewlett
Lawrence J. Lincoln, 1185 Franklin Ave.

Ithaca
Bryant Fleming, 118 Dryden Rd.
Arthur N. Gibb, 302 E. State St.
John N. Tilton, Jr., College of Architecture, Cornell University

Jamaica
W. H. Spaulding, 163 Jamaica Ave.

Jamestown
Beck & Tinkham, 31 Bailey Bldg.

Middletown
Robert R. Graham, 25 Prospect St.

Mount Vernon
Stern & Peyser, 9 W. Prospect Ave.

New Rochelle
Edward John Smith, 105 Crawford Terr.

New York
Adams & Prentice, 15 W. 38th St.
Grosvenor Atterbury, 139 E. 53rd St.
Wesley Sherwood Bessell, 655 Fifth Ave.
Walter D. Blair, 154 E. 61st St.
F. Nelson Breed, 25 W. 45th St.
Roger H. Bullard, 607 Fifth Ave.
Frank Burkhard, 640 Rosedale Ave.
Alfred Busselle, 347 Madison Ave.
Walter B. Chambers, 111 E. 40th St.
S. M. Clement, 101 Park Ave.
Coffin & Coffin, 125 E. 46th St.
Cross & Cross, 515 Madison Ave.
Crow, Lewis & Wick, 200 Fifth Ave.
Delano & Aldrich, 126 E. 38th St.
Anthony J. DePace, 151 W. 46th St.
William J. Dilthey, 120 Liberty St.
Div. of Architecture, 80 Centre St.
William F. Dominick, 522 Fifth Ave.
F. Ferdinand Durang, 238 E. 47th St.
Waldron Faulkner, 101 Park Ave.
Wm. Gehron, 101 Park Ave.
Archibald F. Gilbert, 358 Fifth Ave.
Cass Gilbert, Inc., 244 Madison Ave.
William H. Gompert, 40 E. 49th St.
Goodwillie & Moran, 366 W. 126th St.
William S. Gregory, 171 Madison Ave.
Hart & Shape, 247 Park Ave.
George V. Harvey, 101 Park Ave.
Edward Shepard Hewitt, 607 Fifth Ave.
Holden, McLaughlin & Asso., 670 Fifth Ave.
Howe & Lescaze, 211 E. 48th St.
John Mead Howells, 156 E. 46th St.
Thomas H. Irving, 15 Park Row
Louis E. Jallade, 681 Madison Ave.
Eric Kebbon, 522 Fifth Ave.
Knappe & Morris, 192 Lexington Ave.
Robert D. Kohn & Clarence S. Stein, 56 W. 45th St.
Joseph M. Lawlor, 15 W. 38th St.
John M. Liptak, 36 W. 44th St.
Lowinson & Todaro, 29 W. 26th St.
William O. Ludlow, 101 Park Ave.
W. Philip McGovern, 156 E. 42nd St.
Joseph H. McGuire, 5 Columbus Circle
McKim, Meade & White, 101 Park Ave.
Merrill, Humble & Taylor, 23 E. 26th St.
Charles B. Meyers, 31 Union Sq.
Morris & O'Conner, 101 Park Ave.
George Nichols, 144 E. 30th St.
Peabody, Wilson & Brown, 140 E. 39th St.
Polhemus & Coffin, 232 Madison Ave.
Office of John Russell Pope, 542 Fifth Ave.
George B. Post & Sons, 101 Park Ave.
Wilson Potter, 22 E. 17th St.
Rasmussen & Wayland, 45 W. 45th St.
Robert J. Reily, 12 E. 41st St.
Ralph M. Rice, 33 W. 42nd St.
James Gamble Rogers, Inc., 156 E. 46th St.
Rossiter & Muller, 15 W. 38th St.
William Edgar Shepherd, 597 Fifth Ave.
Edward I. Shire, 373 Fourth Ave.
Shreve, Lamb & Harmon, 11 E. 44th St.
Smith & Ward, 100 E. 42nd St.
Starrett & Van Vleck, 267 Fifth Ave.
Stearns & Stanton, 160 Fifth Ave.
Gustave E. Steinback, 157 W. 74th St.
Stoughton & Bowdoin, 156 E. 42nd St.
Thompson, Holmes & Converse, 101 Park Ave.
Tilton & Githens, 420 Lexington Ave.
Tooker & Marsh, 101 Park Ave.
John V. Van Pelt, 25 W. 45th St.
T. Visscher & J. Burley, 51 E. 42nd St.
F. B. & A. Ware, 1170 Broadway
Harold Werner, 489 Fifth Ave.
Edgar I. Williams, 1 Park Ave.
York & Sawyer, 100 E. 42nd St.

Niagara Falls
Kirkpatrick & Cannon, 503 3rd St.
Charles F. Obenbach, Gluck Bldg.
Chester R. Phelps, 523 Gluck Bldg.

Olean
A. W. E. Schoenberg, 31 Hamilton Ave.

Port Jefferson
Daniel Perry, 130 Surf Ave.

Poughkeepsie
Edward C. Smith, 39 Market St.

Rensselaer
Clarence H. Gardinier, 54 Bellview Terr.

Richfield Springs
Myron A. Jordan

Riverdale-on-Hudson
Dwight James Baum

Rochester
Carl C. Ade, 80 E. Ave.
C. Storrs Barrows, 56 James St.
Charles A. Carpenter, 325 Genesee Valley Trust Bldg.
Dryer & Dryer, Fitch Bldg.
William G. Kaelber, 311 Alexander St.
George F. Lorenz, 3086 St. Paul Blvd.
Francis R. Scherer, 13 S. Fitzhugh St.
Smith & Stickney, 154 East Ave.

Rome
Frank W. Kirkland, 131 W. Liberty St.

Schenectady
R. L. Bowen, 207 State St.

Southampton
William I. Lafon, Jr., 242 Herrick Rd.

Springfield Gardens
H. J. Reed Barrett, 13928 228th St.

Syracuse
Willard H. Bennett & T. Pederson, Asso., Clinton Sq. Bldg.
Melvin L. & Harry A. King, 300 Denison Bldg.
Randall & Vedder, 705 Sedwick, Andrews & Kennedy Bldg.
D. Kenneth Sargent, 212 Harrison St.
Wright & Ellis, 802 City Bank Bldg.

Troy
M. F. Cummings & Son, 297 River St.

Utica
Bagg & Newkirk, 258 Genesee St.
Edward J. Berg, Berg Bldg.
Kinne & Frank

Valley Stream
Frederic P. Wiedersum, 240 Rockaway Ave.

Watertown
Office of D. D. Kieff, Chamber of Commerce Bldg.
Lansing, Greene & Bisnett, 406 Trust Bldg.
Albert M. Skinner, 228 Arsenal St.

Westport
Quentin F. Haig

White Plains
E. Dean Parmelee, Peoples Bank Bldg.

Yonkers
H. Lansing Quick, Yonkers Savings Bank Bldg.

NORTH CAROLINA

Asheville
Ronald Greene Ltd., 227 Arcade Bldg.

Charlotte
Louis H. Asbury, Commercial Bank Bldg.
Charles C. & Walter W. Hook, 1204 Commercial Bldg.
M. R. Marsh, 509 Builders' Bldg.

Durham
Atwood & Weeks, Inc., Trust Bldg.

Gastonia
Hugh E. White, 207 W. 4th Ave.

Greensboro
Harry Barton, 734 Jefferson Standard Bldg.
C. C. Hartmann
Joseph J. Sawyer

Henderson
Eric G. Flannagan, 215 Young Ave.

Hendersonville
E. G. Stillwell

Hickory
Q. E. Herman, P. O. Box 538

High Point
Eccles D. Everhart

Leaksville
James W. Hopper

Monroe
I. J. Tucker, Wadesboro Ave.

Raleigh
G. R. Berryman
Wm. Henley Deitrick, 102 W. Hargett St.

Wilson
Benton & Benton, Fidelity Bldg.

Winston-Salem
Harold Macklin, 328 Reynolds Bldg.

NORTH DAKOTA

Bismarck
Ritterbush Bros., 209 N. 7th St.

Devils Lake
John Marshall, 205 5th St.

Fargo
Braseth & Houkom, 118 Broadway
William F. Kurke

Grand Forks
Jos. Bell DeRemer, 1610 Veits Ave.
Theodore B. Wells, 1006 Chestnut St.

Jamestown
Gilbert R. Horton, Box 1217

Minot
E. W. Molander
Ira L. Rush

OHIO

Ada
Smull & Unger

Akron
M. M. Konarski, Board of Education
Kraus & Helmkamp, 275 W. Market St.
Lauer & Huff, 31 N. Summit St.

Bowling Green
S. P. Stewart & Son, W. Wooster St.

Bucyrus
William Unger, E. Mansfield St.

Cincinnati
Charles Frederick Cellarius, 906 St. Paul Bldg.
Robert E. Crowe, 2436 Reading Rd.
Gustave W. Drach, Inc., Union Trust Bldg.
F. W. Garber, 616 Walnut St.
Grunkemeyer & Sullivan, 3717 Eastern Ave.
Harry Hake, 2400 Gilbert Ave.
Samuel Hannaford & Sons, 1024 Dixie Terminal Bldg.
Hunt & Allan, 512-18 Eagle Savings Bldg.
E. C. & G. T. Landberg, Asso., 114 Garfield Pl.
Matthews & Denison, 514 Main St.
J. A. Nardini, 111 E. 4th St.
Anton Rieg, 49 W. Corry St.
J. F. Sheblessy, 1202 Republic St.
Tietig & Lee, 34 W. 6th St.

Cleveland
Dunn & Copper, Hanna Bldg.
Fox & Duthie, 1936 Union Trust Bldg.
Harry A. Fulton, 8120 Euclid Ave.
Garfield, Stanley-Brown, Harris & Robinson, 915 Nat. City Bldg.
Hubbell & Benes Co., 4500 Euclid Ave.
William Koehl, 1960 Euclid Ave., Rm. 708
Walter R. McCornack, 10006 Carnegie Ave.
Charles Bacon Rowley & Associates, Inc., 2008 Keith Bldg.
Harlen E. Shimmin, 401 Bulkley Bldg.
Small, Smith & Reeb, 1508 Terminal Tower
James W. Thomas, Standard Bldg.
Walker & Weeks, 2341 Carnegie Ave.
Warner & Mitchell, Buckley Bldg.
Jos. L. Weinberg, 1836 Euclid Ave.

Columbus
E. W. Austin, 17 S. High St.
Harsh & Davies, 145 N. High St.
Edward Kromer, 270 E. State St.
Robert R. Reeves, 203 E. Broad St.
Richards, McCarty & Bulford, 584 E Broad St.
F. S. Rusk, 35 E. Main St.

Dayton
Geyer & Neuffer, 437 Ludlow Arcade
Lawrence H. Hall, 973 Manhattan Ave.
Albert & Freeman A. Pretzinger, 1155 Reibold Bldg.
Schenck & Williams, 1406 Third Nat. Bldg.
Walker & Norwick, American Bldg.

Hamilton
George W. Barkman
Frederick G. Mueller & Walter R. Hair, Hotel Hamilton

Hillsboro
Henry R. Ervin, 114 N. High St.

Lima
Hulsken & Strong, 506 Savings Bldg.
Thomas D. McLaughlin & Associates, 500 Dominion Bldg.

Mansfield
Althouse & Jones, Farmers Bank Bldg.
Harry J. Brumenshenkel, Walpark Bldg.
Vernon Redding & Associates, 616 Walpark Bldg.

Mt. Vernon
J. E. Lewis, 1004 Newark Rd.

Nelsonville
William Mills, Citizens Central Bank Bldg.

New Philadelphia
Office of Charles J. Marr, 151½ N. Broadway

Norwalk
Granville E. Scott, Citizens Nat. Bank Bldg.

Portsmouth
DeVoss & Donaldson, 1st Nat. Bank Bldg.

Sandusky
H. C. Millott, 814½ Washington St.

Steubenville
Fred H. Clarke, 1002 Nat. Exchange Bank Bldg.

Tiffin
Trexel, Pahl & Porter, 201 Laird Bldg.

Toledo
Gerow & Conklin, 346 Spitzer Bldg.
Jokel & Lange, 320 Ontario St.
Mills, Rhines, Bellman & Nordhoff, Inc., 1515 Ohio Bank Bldg.
Stophlet & Stophlet, 708 Security Bank Bldg.

Warren
Keich & O'Brien, 913 Union Savings & Trust Bldg.

Youngstown
Paul Boucherle, 302 Union Nat. Bk. Bldg.
Clarence A. Kissinger, 2141 Market St.
H. F. Kling & Son, 314 N. Phelps St.
M. Gilbert Miller, 12 W. Madison Ave.

OKLAHOMA

Ada
Albert S. Ross, 213 American Bldg.

Ardmore
J. B. White & Son, 902 B St., N. W.

Bartlesville
Arthur Gorman

Chickasha
Paul Harris, Oklahoma Nat. Bank Bldg.

Enid
R. W. Shaw, 734 Bass Bldg.

Muskogee
H. O. Valeur & Company, 1101 W. Broadway

Norman
Joe E. Smay, University of Oklahoma

Oklahoma City
Leonard H. Bailey, 1217 Colcord Bldg.
Layton, Hicks & Forsyth, Braniff Bldg.
J. O. Parr, 1022 Hales Bldg.
Guy Reid, 602 Oklahoma Savings Bldg.

Tulsa
Donald McCormick, 1242 S. Boston Ave.
Leon B. Senter, 306-7 Philtower Bldg.

OREGON

Baker
Wallace Landreth, Baker Loan & Trust Bldg.

Eugene
Graham B. Smith, Register-Guard Bldg.

Klamath Falls
Howard R. Perrin, Underwood Bldg.

Portland
John V. Bennes, 712 Lewis Bldg.
A. E. Doyle & Associate, 1040 Pacific Bldg.
Francis B. Jacobberger, 208 McKay Bldg.
George H. Jones, Woodlark Bldg.
Lawrence, Holford & Allyn, 925 Failing Bldg.
F. Marion Stokes, 1301 Terminal Sales Bldg.
Lee A. Thomas, 220 Weatherly Bldg.
Tourtellotte & Hummel, 311 Postal Bldg.
Whitehouse, Stanton & Church, Railway Exchange Bldg.

PENNSYLVANIA

Allentown
Jacoby & Everett, Commonwealth Bldg.
Ruhe & Lange, 12 N. Sixth St.

Altoona
Hunter & Caldwell, 3601 5th Ave.

Ardmore
Ralph E. White

Bradford
Thomas K. Hendryx, I. O. O. F. Bldg.

Canonsburg
George W. Brugger, First Nat. Bank Bldg.

Carlisle
Bobb & Bixler, 52 E. High St.

Charleroi
J. C. Brenton, First Nat. Bank Bldg.

Chester
Clarence W. Brazer, 421 Market St.

Donora
Conrad C. Compton, 4th St. & Thompson Ave.

Doylestown
A. Oscar Martin & Son, 14-15 Hart Bldg.

Du Bois
R. G. Howard & Associates

Erie
Fred A. Fuller, 721 Commerce Bldg.
J. Howard Hicks, 1728 W. 11th St.
Clement S. Kirby, 4502 Homeland Ave.
Meyers & Johnson, Commerce Bldg.
Walter T. Monahan, 4128 State St.

Greensburg
Robert J. Brocker, 201 Coulter Bldg.
C. H. Sorber, First Nat. Bank Bldg.

Harrisburg
Hasness & Albright, 213 Walnut St.
Lawrie & Green, Third & Forster Sts.
C. Howard Lloyd, 1011 N. Front St.

Johnstown
J. E. Adams, Alma Hall

Kittanning
Tillman Scheeren, Jr., Boarts Bldg.

McKeesport
C. R. Moffitt, Masonic Temple

New Castle
W. G. Eckles Company, Lawrence Savings & Trust Bldg.
The Thayer Company, Greer Bldg.

Oil City
W. Holmes Crosby & Company, 32-33 Beers Bldg.

Philadelphia
The Ballinger Co., 105 S. 12th St.
W. Pope Barney, 1805 Walnut St.
Wesley Lesher Blithe, 1524 Chestnut St.
Boyd, Abel & Gugert, Architects Bldg.
Arthur H. Brockie, Architects Bldg.
G. Edwin Brumbaugh, Girard Trust Co. Bldg.
Horace W. Castor, Architects Bldg.
Irwin T. Catharine, Parkway at 21st St.
Paul P. Cret, Architects Bldg.
Henry D. Dagit & Sons, 1329 Race St.
Davis & Dunlap, 1805 Walnut St.
Wilson Eyre & McIlvaine, 1003 Spruce St.
Folsom & Stanton, Architects Bldg.
Heacock, Hokanson & C. A. Scheuringer, 1211 Chestnut St.
Virgil L. Johnson, 21st & Winter Sts.
Karcher & Smith, 1520 Locust St.
Charles Z. Klauder, 1429 Walnut St.
Louis T. Klauder, 1632 Lincoln-Liberty Bldg.
W. H. Lee, Schaff Bldg.
Mellor & Meigs, 205 S. Juniper St.
Emile G. Perrot, 1405 N. 16th St.
Savery & Sheetz, Stephen Girard Bldg.
Sellers & Braik, 315 S. 15th St.
H. R. Stackhouse & Ralph L. Goldberg, 1610 Spruce St.
Harold Sternfeld, Architects Bldg.
Messrs. Stewardson & Page, 315 S. 15th St.
Sundt & Wenner, 1701 Arch St.
Thomas & Martin, Architects Bldg.
Tilden, Register & Pepper, 1608 Walnut St.
Horace Trumbauer, 1406 Land Title Bldg.
Simon Wassermann, 136 S. 4th St.
Frank R. Watson, Edkins & Thompson, Architects Bldg.
Zantzinger & Borie, 17th & Sansom Sts.

Pittsburgh
Thos. Hannah, 930 Grant Bldg.
J. Lawrence Hopp, 508 Third Ave.
Ingham & Boyd, 1211 Empire Bldg.
Kaiser, Neal & Reid, 324 Fourth Ave.
Edward B. Lee, Chamber of Commerce Bldg.
Albert George Lowe, 409 Commonwealth Bldg. Annex
Raymond M. Marlier, Empire Bldg.
Maximilian Nirdlinger, 907 Empire Bldg.
Casimir J. Pellegrini, 205 N. Highland Ave.
John H. Phillips, Wabash Bldg.
Thomas Pringle & Oliver T. Robling, 217 9th St.
Schwab & Palmgreen, Koppers Bldg.
James T. Steen & Sons, 323 Fourth Ave.
Louis Stevens, Century Bldg.
Edward Stotz, 801 Bessemer Bldg.
Robert Maurice Trimble, Commonwealth Bldg. Annex
Harry Viehman, Chamber of Commerce Bldg.
W. Ward Williams, 331 Fourth Ave.

Pottsville
Phillip G. Knobloch, W. Market St.

Reading
William H. Dechant & Sons, 632 Washington St.
G. C. Freeman, 419 Carsonia Ave.
W. Marshall Hughes, 147 N. 5th St.
Muhlenberg Brothers, 113A S. 4th St.
Muhlenberg, Yerkes & Muhlenberg, 5th & Walnut Sts.
Scholl & Richardson, 1015 Penn St.

Sayre
Harry C. Child, 501-503 S. Keystone Ave.

Scranton
Arthur P. Coon, Union Bank Bldg.
E. H. Davis & G. M. D. Lewis, Scranton Electric Bldg.
Lester Merritt Davis, Rehrig Bldg.

Uniontown
H. W. Altman, Fayette Title & Trust Bldg.
Emil R. Johnson & Clarence F. Wilson, 703 Fayette Title & Trust Bldg.

Wilkes-Barre
Mack & Sahm, 22 N. Franklin St.

York
John B. Hamme, 31 W. Market St.
Witman & Royer, 369 Market St.

RHODE ISLAND

Pawtucket
Albert H. Humes, 332 Main St.
Monahan & Meikle, 255 Main St.

Providence
Irving S. Gorman, Public Bldg. Dept., City Hall
Albert Harkness, 1428 Industrial Trust Bldg.
Joseph A. Hickey, 45 Oldham St.
Jackson, Robertson & Adams, 1216 Turks Head Bldg.

SOUTH CAROLINA

Anderson
Charles Wm. Fant, 109½ Sharpe St.

Bennettsville
H. D. Harrall, 717 W. Main St.

Charleston
Simons & Lapham, 42 Broad St.

Clemson College
Rudolph E. Lee

Columbia
J. B. Urquhart

Greenville
J. G. Cunningham, 210-A E. Coffee St.

Prosperity
Heyward S. Singley

SOUTH DAKOTA

Mitchell
Walter J. Dixon, Woelfel Bldg.

Sioux Falls
Hugill & Blatherwick, 367 Boyce Greeley Bldg.
Perkins & McWayne, 320 Paulton Bldg.

TENNESSEE

Chattanooga
Wm. Crutchfield & H. G. Law, 929 Chattanooga Bank Bldg.
Clarence T. Jones, 210 Glenwood Drive
Martin & Franklin, 806 Cherry St.
W. H. Sears, James Bldg.
Gordon L. Smith, 1001-2-3 Volunteer Bldg.

Johnson City
Coile & Cardwell

Knoxville
Frank O. Barber, 720 Market St.
Barber & McMurry, General Bldg.
Baumann & Baumann, 813½ Market St.
Manley & Young

Memphis
George Awsumb, 1792 Forrest Ave.
Estes W. Mann, 967 Shrine Bldg.
Walter Nelson, 147 S. 3rd St.
Regan & Weller, 736 Commerce Telephone Company Bldg.

Nashville
Office of Joseph W. Hart, 602 Hitchcock Bldg.
Granbery Jackson, Jr., 420 Vendome Bldg.
McKissack & McKissack, Morris Memorial Bldg.
Tisdale & Pinson, 806 Independent Life Bldg.

TEXAS

Abilene
David S. Castle Company, 108½ N. 1st St.

Amarillo
Guy A. Carlander, 4616 Bushland St.
Rittenberry & Carder, 1002 Fisk Bldg.

Austin
Giesecke & Harris, 207 W. 7th St.
W. E. Ketchum, 1615 S. Cong. Ave.
Robert L. White, 2200 Guadalupe St.

Beaumont
Jos. G. Beck, 978 Orange St.
Livesay & Wiedemann, San Jacinto Bldg.
F. W. & D. E. Steinman & A. S. Golemon, 1012 San Jacinto Bldg.

Brownsville
Ben V. Procter, 139 Washington St.

Cisco
R. S. Glenn

Cleveland
Emory S. White

Corpus Christi
Hamon & Co., 508 Sherman Bldg.
Nat W. Hardy, 59 Country Club Place

Corsicana
Blanding & Horn

Dallas
Arthur A. Brown, 603 Mercantile Bldg.
Eugene Davis, Central Bank Bldg.
DeWitt & Washburn, 1013 Praetorian Bldg.
Flint & Broad, 411 Burt Bldg.
Anton F. Korn & W. J. B. Sullivan, 504 Thomas Bldg.
Walter C. Sharp, Construction Bldg.
Arthur E. Thomas, 407 Construction Bldg.

Fort Worth
Preston M. Geren, 417 Bewley Bldg.
Earl T. Glasgow, 401 W. T. Waggoner Bldg.
Wyatt C. Hedrick, Inc., 1005 First Natl. Bank Bldg.
C. M. Love & Co., 314 S. Henderson St.
Joseph R. Pelich, 1103 Trinity Life Bldg.
Elmer G. Withers Architectural Co., Inc., 610 Holmes Bldg.

Greenville
Lindsey & Kilmer

Houston
James I. Campbell, 3415 Austin St.
Lamar Q. Cato, 801-802 M. & M. Bldg.
Henry F. Jonas & Tabor, 209 Union National Bank
Joseph W. Northrop, Jr., 3940 Main St.
Harry D. Payne, 4301 Main St. at Richmond Ave.
Maurice J. Sullivan, 4301 Main St.
Vorse, Kraetsch & Kraetsch, 625 Mason Bldg.

Longview
Peters, Strange & Co., 216 Glover Crim Bldg.

Lubbock
S. B. Haynes, 511 Myrick Bldg.

Palestine
Theo. S. Maffitt, 510 N. Sycamore St.

Paris
Smith & Praeger

San Angelo
John G. Becker

San Antonio
Charles T. Aubin, 1114 Smith-Young Tower
Atlee B. & Robert M. Ayres, Smith-Young Tower
Ralph H. Cameron, P. O. Box 1063
Leo M. J. Dielmann, 306 E. Commerce St.
Marvin M. Eickenroht, 801 Maverick Bldg.
John M. Marriott, 220 Frost Nat. Bank Bldg.
Will N. Noonan, 801 N. Pine St.
Phelps & Dewees, 630 Gunter Bldg.
Harvey P. Smith, National Bank of Commerce Bldg.

Sherman
John Tulloch, M & P Bank Bldg.

Tyler
Shirley Simons, 412 Citizens Bank Bldg.

Weslaco
R. Newell Waters

Wichita Falls
Voelcker & Dixon, 913½ Indiana Ave.

UTAH

Ogden
Hodgson & McClenahan, 505 Eccles Bldg.
Eber F. Piers, 2726 Harrison Ave.

Provo
Ashworth & Markham, 207 N. University Ave.
Joseph Nelson, F. & M. Bank Bldg.

Salt Lake City
Lenord C. Neilson, McIntyre Bldg.
Scott & Welch, Dooly Bldg.
Walter E. Ware, 610 Utah Savings & Trust Bldg.

VERMONT

Rutland
Arthur H. Smith, Gryphon Bldg.

VIRGINIA

Blacksburg
C. H. Cowgill

Lynchburg
Clark & Crowe, 610 Krise Bldg.
Craighill & Cardwell, Peoples Bank Bldg.
Hinnant & Smith, 304 Peoples Bank Bldg.
S. S. Johnson & R. O. Brennan, Allied Arts Bldg.

Newport News
Williams, Coile & Pipino, 408 Melson Bldg.

Norfolk
C. A. Neff, Seaboard Bank Bldg.
Rudolph, Cooke & Van Leeuwen, 355 Arcade Bldg.

Richmond
Raymond V. Long, State Board of Education
Edward F. Sinnott, 112 E. Cary St.
J. Binford Walford, 10th St. Bldg.

Roanoke
H. M. Miller, 731 Shenandoah Life Bldg.
Louis Philippe Smithey, 112 W. Kirk Ave.

Staunton
T. J. Collins & Son, Box 534

University
S. J. Makielski, Barracks Road

WASHINGTON

Aberdeen
Clarence W. George, 203 Becker Bldg.

Bellingham
F. Stanley Piper, 201-3 Herald Bldg.

Olympia
Joseph H. Wohleb, 206 Chambers Bldg.

Pullman
Stanley A. Smith, College Archt., State College of Washington

Seattle
Baker, Vogel & Roush, Smith Tower
Bebb & Gould, 715 Hoge Bldg.
John Graham, Dexter Horton Bldg.
William Mallis, 330 Lyon Bldg.
F. A. Naramore, 511 Central Bldg.
Fred B. Stephen, 2108 Smith Tower
Stimson & McDonald, Joseph Vance Bldg.

Spokane
Charles I. Carpenter, Sun Life Bldg.
G. Albin Pehrson, Old National Bank Bldg.
George M. Rasque, 304 Spokane Savings & Loan Bldg.
Rigg & Vantyne, 525 Peyton Bldg.
Francis P. Rooney, 209 Lindell Bldg.
Whitehouse & Price, 628 Hutton Bldg.

Tacoma
E. J. Bresemann, Perkins Bldg.
Mock & Morrison, 228 Perkins Bldg.
Silas E. Nelsen, 405 S. Sheridan St.
Fred G. Rounds, 825 Rust Bldg.

Yakima
John W. Maloney, 1117 Larson Bldg.

WEST VIRGINIA

Bluefield
Garry & Sheffey, 617 Bailey Bldg.
Alex B. Mahood, Law & Commerce Bldg.

Buckhannon
Carl Reger, Box 27

Charleston
Herbert S. Kyle, Suite 1107 Union Bldg.
Warne-Tucker-Silling, 314 Masonic Bldg.

Clarksburg
E. C. Holmboe

Huntington
Frampton & Bowers, 412 11th St.

Wheeling
Frederick Faris, 1117 Chapline St.
Edward Bates Franzheim, 1425 Chapline St.

WISCONSIN

Eau Claire
Aloysius W. Bayer, 213 S. Barstow St.
Carl Volkman, McGrath Bldg.

Green Bay
Foeller, Shober & Berners, 310 Pine St.
Oppenhamer & Obel, 110 S. Washington St.

La Crosse
Otto A. Merman, 203 Gateway City Bank Bldg.
Parkinson & Dockendorff, Box 785

Madison
Law, Law & Potter, 1 S. Pinckney St.
Frank S. Moulton, 110 E. Washington Ave.
Edward Tough, E. Washington St.

Manitowoc
Wm. J. Raeuber, 401 Savings Bank Bldg.
Smith & Brandt, Dempsey Bldg.

Milwaukee
N. P. Backes, 3069 S. Wentworth St.
Peter Brust, 135 W. Wells St.
Eschweiler & Eschweiler, 720 E. Mason St.
Herbst & Kuenzli, 1249 N. Franklin Pl.
Lindl & Schutte, Inc., 1025 E. Circle Drive
Robert A. Messmer & Bro., 231 W. Wisconsin Ave.
Herbert W. Tullgren, 1234 N. Prospect Ave.
Thomas S. Van Alyea, 1422 E. Albion St.
Van Ryn & De Gelleke, 152 W. Wisconsin Ave.
Guy E. Wiley, 1111 N. 10th St.

Oshkosh
Auler, Jensen & Brown, E. R. A. Bldg.

Racine
F. J. Hoffman, 503 Janes Bldg.

Superior
R. C. Buck, Inc., 919 Tower Ave.

Wauwatosa
Mark F. Pfaller, 8525 Ravenswood Circle

ALASKA

Juneau
N. Lester Troast

HAWAII

Honolulu
C. W. Dickey, Damon Bldg.
Guy N. Rothwell, 987 Waimano St.

CANADA

Calgary, Alberta
W. A. Branton, Calgary School Board, City Hall

Edmonton, Alberta
H. Story, Public School Board Office, Civic Block

Halifax, N. S.
C. A. Fowler & Co., Capital Bldg.

London, Ont.
O. Roy Moore & Company, 489 Richmond St.

Merritton, Ont.
Lionel A. Hesson

Montreal, Que.
Alcide Chausse, 706 St. Gabriel St.
Gorden & Thompson, 2049 McGill Ave.
Alfred Potvin, 750 St. Gabriel St.
Edward J. Turcotte, 1135 Beaver Hall Hill

Ottawa, Ont.
Richards & Abra, 55 Metcalfe St.

Regina, Sask.
F. H. Portnall, Credit Foncier Bldg.
W. G. Van Egmond & Stan. R. Storey, McCallum Hill Bldg.

St. John, N. B.
H. Claire Mott, 13 Germain St.

Saskatoon, Sask.
Frank R. Martin, Avenue Bldg.

Sherbrooke, Que.
Louis N. Audet, 32 Wellington St., N.

Toronto, Ont.
S. B. Coon & Son, 4 St. Thomas St.
Craig & Madill, 96 Bloor St., W.
Mathers & Haldenby, 96 Bloor St., W.
Wm. Lyon Somerville, 2 Bloor St., W.

Vancouver, B. C.
Bowman & Cullerne, 325 Howe St.

Welland, Ont.
Norman A. Kearns, 41 Temple Bldg.

Winnipeg, Man.
W. A. Martin, Winnipeg Public School Board

Wolfville, N. S.
Leslie R. Fairn

SECTION XII

AIDS AVAILABLE TO LOCAL SCHOOL BOARDS FROM STATE DEPARTMENTS

Participation of State Agencies in Planning and Supervising Local School-Building Development

IN the planning of buildings for a public school system, it frequently is desirable to know the degree to which the state board of education has provided for participation and cooperation. The following summary segregates the character of the supervision given by the state and its representative agencies under three headings. The first item indicates the action which the state board may be expected to take. The second item shows the part played by the state superintendent of schools as the official spokesman for the state department of education. In the third part will be found indications of the assistance or guidance which other state agencies will give. The form of tabulation has necessitated very brief statements covering these responsibilities, but the degree and character of participation are clearly shown for each state. The list has been revised up to November, 1934.

THE STATES' PARTICIPATION IN SCHOOL-BUILDING CONSTRUCTION

ALABAMA

State Board of Education, Montgomery
Approves rules and regulations for the hygienic, sanitary, and protective construction of school buildings.
State Superintendent, J. A. Keller
Prepares and submits to state board rules and regulations for hygienic, sanitary, and protective construction of school buildings.
The division of schoolhouse planning prepares plans and specifications for the erection and repairs of rural school buildings, and supervises the construction of state-owned buildings.
Director of Schoolhouse Planning, R. E. Ledbetter

ARIZONA

State Board of Education, Phoenix
No jurisdiction whatever in regard to buildings erected by districts.
State Superintendent of Public Instruction, H. E. Hendrix
No jurisdiction.
Other Agencies
Board of health issues regulations.

ARKANSAS

State Board of Education, Little Rock
Has a division of school grounds and schoolhouse planning.
Director prepares plans for 1- to 7-teacher buildings, and for such buildings as teachers' homes, shops, home economics buildings, gymnasiums, etc.
Furnishes preliminary sketches of floor plans for larger buildings.
Checks architects' plans for school buildings upon request.
Advises school officials as to plans for remodeling, repairing and altering school buildings.
Advises superintendents and teachers as to interior arrangements, furniture and equipment.
Superintends the construction of all school buildings during progress of erection.
State Commissioner, W. E. Phipps
No legal provision for approval.
Director, School Plant Division, J. Odell Baker

CALIFORNIA

State Superintendent of Public Instruction, Vierling Kersey, Sacramento
Division of schoolhouse planning passes on all plans costing more than $5,000, excepting those in the largest cities; is called into consultation by city districts, and controls other situations by surveys.
Site sizes and locations controlled by state standards.
No building contract, in situations coming under the department's jurisdiction, is legal without the required approval.
This department does not make working drawings.
Chief of Division of Schoolhouse Planning, Dr. Charles W. Bursch

COLORADO

State Superintendent of Public Instruction, Mrs. Inez Johnson Lewis, Denver
School building handled by local boards of education.

CONNECTICUT

State Board of Education, Hartford
Has a bureau of building construction and maintenance which approves plans. Chief inspects school buildings for safety.
Publishes standards for guidance of local boards.
Has consulting architect to whom plans are referred.
Assists local communities in building surveys.
State Commissioner, E. W. Butterfield

DELAWARE

State Board of Education, Dover
Outside Wilmington prepares a tentative program of school building to submit to local boards.
Hears comments and suggestions thereon.
Creates standards with effect of law, governing hygienic, sanitary, and protective construction; selection, arrangement, and maintenance of sites; condemns school buildings.
Has approval of plans and specifications.
State Superintendent of Public Instruction, Dr. H. V. Holloway
Other Agencies
Legislature has created a state school-building act.
There is a state school-building account.
State school-building commission for each district.
Plans approved by state board of education and commission.
Buildings built by commission.
Construction supervised by commission.
Board of health has to approve drinking water and sewage disposal.

DISTRICT OF COLUMBIA

Superintendent of Schools, Frank W. Ballou, Washington
Local Board of Education passes on all plans for school buildings. These plans are submitted by the office of the Municipal Architect.
First Assistant Superintendent Crane is in charge of business affairs. This officer consults with the office of the Municipal Architect on matters pertaining to plans for buildings and improvement of grounds. He also advises with school officials and submits written reports to the Committee on Buildings, Grounds and

Equipment of the Board of Education. This officer inspects all school buildings and is in charge of repairs and improvements. He is the liaison officer between the schools and the municipal government in matters pertaining to the physical welfare of the schools.

Other Agencies

The Health Officer of the District of Columbia issues reports on the sanitary inspection of buildings.

Representatives of the Fire Department of the District of Columbia visit the school buildings regularly for the protection of the schools.

Municipal Architect, Nathan C. Wyeth

FLORIDA

State Superintendent of Public Instruction, Dr. W. S. Cawthon, Tallahassee

Has oversight, charge, and management of all matters pertaining to public schools, school buildings and grounds.

GEORGIA

State Superintendent of Schools, Dr. M. D. Collins, Atlanta

Furnishes plans and specifications for school-building guidance in local units.

Supervisor of schoolhouse construction prepares plans for 1- to 6-teacher buildings; prepares school ground plans; checks architects' plans; advises school officials.

Other Agencies

County superintendent and county board of education approve plans.

Supervisor of Schoolhouse Planning, W. W. Simmons

IDAHO

State Board of Education, Boise

Standardization of:
- Sanitary appliances
- School furniture
- School equipment and supplies
- School buildings

Issues plans for 1-, 2-, 3-room buildings.

Requires approval of all plans.

State Superintendent, J. W. Condie

Other Agencies

Department of public welfare has to cooperate with state board of education in its duties regarding schools.

County superintendent has power to require local trustees to conform to rules of state board "if there is money enough."

County board of health is responsible for sanitation in schools.

ILLINOIS

State Superintendent of Public Instruction, Dr. Francis G. Blair, Springfield

Prepares, with advice of state board of health, state architect, and state fire marshal, specifications for minimum requirements in heating, ventilation, lighting, seating, water supply, toilets, safety against fire.

These have force of law.

Other Agencies

State architect is required to assist the state superintendent of schools.

Enforcement of law is in the hands of county superintendents and local authorities.

County superintendent approves plans according to standards of state board.

Advises school officials in details of construction, but only on standards is it necessary to follow him.

County superintendent inspects buildings.

Board of directors and board of education required to submit plans to county superintendent.

INDIANA

State Superintendent of Public Instruction, Floyd I. McMurray, Indianapolis

Other Agencies

Local school trustees erect buildings. Plans and specifications must be submitted to state board of health for approval of sanitation and hygiene; to state board of accounts for adequacy of specifications and fair competition; and to state fire marshal for compliance with state fire laws.

State board of health issues standards.

IOWA

State Superintendent of Public Instruction, Agnes Samuelson, Des Moines

Shall prepare and publish, when deemed necessary, a pamphlet containing suitable plans and specifications.

KANSAS

State Board of Education, Topeka

"No provision in the laws to prevent the erection of undesirable buildings or to compel the discontinuance of buildings that should be abolished immediately, further than plans for all new school buildings must be submitted to the state architect as to provision for fire protection according to law." Section 421, Revised School Laws of Kansas for 1931.

Has adopted standardization of rural schools involving among other things: out-building; school-building equipment; and the school building itself.

State Superintendent of Public Instruction, W. T. Markham

Criticizes and approves plans submitted voluntarily by local authorities.

State Architect, Ray A. Coolidge

KENTUCKY

State Board of Education, Frankfort

Authorized to approve and adopt regulations for the sanitary and protective construction of public school buildings.

State Superintendent of Public Instruction, James H. Richmond

With concurrence of state board of health prepares regulations for the sanitary and protective construction of public school buildings. Prepares plans and specifications for 1- to 4-teacher public school buildings, for adoption by the state board of education. Examines and approves or disapproves plans and specifications submitted by county boards of education and graded boards of education.

Director of School Buildings and Grounds, J. W. Brooker

LOUISIANA

State Superintendent of Public Education, T. H. Harris, Baton Rouge

Approves plans which board of health regulations require submitting to him.

Other Agencies

Board of health regulations require submittal of plans to:
- Parish superintendent of schools
- State superintendent of schools
- Parish health officer

for hygienic or necessary provision for ventilation, heating, light, fire protection.

MAINE

State Commissioner of Education, Bertram E. Packard, Augusta

No school building can be built or repaired without his approval.

Provides plans for 1- to 4-room buildings free of cost.

Issues minimum requirements so that local units will be able to meet his approval of plans.

Other Agencies

No school building can be built or repaired without approval of board of health.

MARYLAND

State Board of Education, Baltimore

Elementary schools. Standardization includes grounds, buildings, lighting, heating and ventilation, library, equipment.

Has issued "Standards for School Buildings" as a guide to county superintendents.

State Superintendent of Schools, Dr. Albert S. Cook

Sites and plans must be submitted to him for approval; additions to buildings also.

After plans have been approved by the state consultant architect, the state superintendent issues certificate without which no building costing $300 or more can be erected (Sec. 30, Article 17, Annotated Code of Maryland).

Other Agencies

Plans must be submitted to state board of health for approval of sewage-disposal arrangements and plumbing.

MASSACHUSETTS

State Commissioner of Education, Dr. Payson Smith, Boston

Assistants of superintendent do much in consulting with local committees. Loan slides.

Other Agencies

Department of public safety must approve all plans.

Department of public safety issues regulations.

MICHIGAN

State Department of Public Instruction, Lansing

Has issued standards.

Makes surveys, free of cost, of local situations before local board has decided what program should be, upon invitation. Provides administrative and professional leadership.

Provides complete plans and specifications free of charge for all 1- and 2-room buildings.

State Superintendent, Dr. Paul F. Voelker

MINNESOTA

State Board of Education, St. Paul
State aid for building of consolidated schools.
Prescribes rules for schoolhouse construction, including therein rules of the board of health relative to sanitary standards for toilets, water-supply, and disposal of sewage.
State Commissioner, John Gundersen Rockwell
Examines all plans and specifications with power of approval or otherwise.
He may condemn buildings under his own or the state board of education's rules.
Other Agencies
The law authorizes county superintendent to advise local school boards in regard to buildings and ventilation, but, as a matter of fact, the county superintendent does not exercise this power. All such questions come to commissioner of education.
Director, Division of Buildings and Sanitation, Samuel A. Challman

MISSISSIPPI

State Department of Education, Jackson
Has a division of school building service. This division:
Cooperates in making surveys on the effective organization of schools.
Makes surveys to determine building needs.
Outlines building programs.
Approves architects' plans and specifications for school buildings.
Furnishes free plans and specifications for some small school buildings, teachers' homes and accessory buildings.
General advisory service on school-plant planning and equipment and on the effective use of the school plant.
State Superintendent, Dr. W. F. Bond

MISSOURI

State Department of Education, Jefferson City
Has prepared "Standards for Schoolhouse Planning and Construction," makes surveys of building needs, prepares and distributes plans and specifications for small buildings, aids in setting up requirements before plans are drawn for larger buildings, checks and approves all plans and specifications, maintains an advisory service on school-building insurance, school-building maintenance, including janitorial training service.
State Superintendent of Public Schools, Charles A. Lee
Other Agencies
The State Department of Public Health aids in checking the water supply.
Director of School Building Service, N. E. Viles

MONTANA

State Board of Education, Helena
Publishes a bulletin on 1- and 2-room rural buildings, containing drawings and plans.
State Superintendent of Public Instruction, Elizabeth Ireland
Plans are furnished local boards by the board of health.

NEBRASKA

State Superintendent of Public Instruction, Charles W. Taylor, Lincoln

NEVADA

State Department of Education, Carson City
Deputy superintendent has authority to check plans for all school buildings.
State Superintendent of Public Instruction, Walter W. Anderson

NEW HAMPSHIRE

State Board of Education, Concord
State Commissioner, James N. Pringle
Interprets meaning of "suitable and sanitary" buildings for all schools. Has general authority to make regulations. Cooperates with superintendents and local school boards in planning buildings.
Recommends to state board of health investigation of unsuitable buildings.
Administrative Field Agent, Paul E. Farnum
Other Agencies
State board of health, on complaint, may condemn or order buildings improved at expense of districts.

NEW JERSEY

State Board of Education, Trenton
Advice and consent to appointment of building inspector by commissioner of education.
Approves plans which must be submitted.
Has set up a code.
State Department of Education
Has a business division with assistant commissioner of education and director of school buildings.
State Commissioner, Dr. Charles H. Elliott
May instruct county and city superintendents as to constructing schoolhouses and furnishing them.
Appoints an inspector of buildings, with advice and consent of state board of education.
Other Agencies
County superintendent has power "to note" conditions of schoolhouses, sites, etc., and advise with local boards in respect to construction, heating and ventilation, and lighting. May, with consent of commissioner of education, cause state moneys to be withheld where facilities are not in accord with legal requirements.
Local boards provide school buildings.
Commissioner of institutions and agencies shall examine and report on school buildings at request of commissioner of education.
Inspector of School Buildings, Walter W. Sharpley

NEW MEXICO

State Superintendent of Public Instruction, H. R. Rodgers, Santa Fé

NEW YORK

State Education Department, Albany
Has a division of school buildings and grounds with a director.
Has set up standards.
Board issues a pamphlet of information for local authorities.
Makes inspections of sites and school conditions before definite action is taken by local authority.
Advises with superintendents, principals, and boards in regard to needs and best way to meet them.
Examines preliminary plans.
State Commissioner, Dr. Frank P. Graves
All plans and specifications must receive the commissioner's approval in all districts other than first and second class cities.
He cannot approve unless plans conform to laws.
No tax can be levied until plans are approved.
Director of School Buildings and Grounds Division, Joseph H. Hixson

NORTH CAROLINA

State Board of Public Instruction, Raleigh
There is a literary loan fund from which loans are made when plans are approved.
State department has a set of standards.
Has plans purchased from architects which it distributes free.
State Superintendent of Public Instruction, Clyde A. Erwin
All plans must be submitted to state superintendent for approval, except in special charter schools.
Other Agencies
Plans must also be submitted to insurance commission for approval, also to state board of health.

NORTH DAKOTA

State Superintendent of Public Instruction, Arthur E. Thompson, Bismarck
Plans must be submitted to and approved by superintendent.

OHIO

State Director of Education, B. O. Skinner, Columbus
Other Agencies
Has a state building code (very elaborate).
All plans must be approved by chief inspector of workshops and factories, except in cities having regularly organized building inspection departments.
District health commissioner checks plans for water-supply and sanitary arrangements. State department of health may make surveys and issue orders as to these matters.

OKLAHOMA

State Superintendent of Public Instruction, John Vaughan, Oklahoma City
Prepares complete plans and specifications for the construction of all school buildings for four teachers or less, costing less than $10,000.
Makes school-building survey for all sizes of buildings.
Approves plans of all sizes, but approval is not required by law.
Other Agencies
Standard building laws.
Book of 300 plans in hands of each county superintendent in the state.
Director of Schoolhouse Planning, Dr. Haskell Pruett

OREGON

State Superintendent of Public Instruction, C. A. Howard, Salem
Issues booklet giving suggested plans for 1-, 2-, and 3-room school buildings. No legal provision for the approval of the state department.

Other Agencies
Plans for schools in third-class districts must be approved by county school superintendents.
County superintendents advise with the school boards relative to the construction, warming, ventilating, and arrangement of schoolhouses.

PENNSYLVANIA

State Department of Public Instruction, Harrisburg
Has a director of division of school buildings.
Prescribes rules and regulations and has power to take such action as it may deem expedient to promote physical and moral welfare of school children.
Department code—
Required to approve plans in 2nd, 3rd, 4th class districts.
Supervises preparation of plans in local communities if asked to do so.
Submits, if asked, suggestive sketches.

State Superintendent of Public Instruction, Dr. James N. Rule

Other Agencies
State code.
Art commission passes on architectural design.
Department of labor and industry passes on fire and panic protection.

Director, Division of School Buildings, Dr. HuBert C. Eicher

RHODE ISLAND

State Commissioner of Education, Dr. Walter E. Ranger, Providence
Part of the income of the permanent school fund may be apportioned by the state board of education to assist towns in constructing model school buildings.

SOUTH CAROLINA

State Superintendent of Education, Dr. James H. Hope, Columbia
Division of schoolhouse planning and construction. Plans must be submitted to and approved by the director of schoolhouse planning.
The director inspects all plans and new buildings, and a certificate of approval is necessary before they can be used.
Plans and specifications and supervision of construction are furnished to small schools not employing an architect.

Other Agencies
Has a state building code.

Director of Schoolhouse Planning, S. P. Clemons

SOUTH DAKOTA

State Superintendent of Public Instruction, I. D. Weeks, Pierre
Plans must be approved by him, and show heating and ventilation scheme. He assists in an advisory capacity in the planning of school buildings; he also helps boards in various ways to show their communities the needs of new buildings and additions to buildings.

TENNESSEE

State Commissioner of Education, Walter D. Cocking, Nashville
Division of schoolhouse planning furnishes working drawings and specifications for buildings up to and including four-teacher buildings. The division offers functional planning advice, and checks plans for larger buildings, where such service is requested.

TEXAS

State Department of Education, Austin
Special state aid fund.

State Superintendent, L. A. Woods

Other Agencies
School-building code.
Plans must be submitted as follows for approval: (1) in a common school district—to the county superintendent; (2) independent district and city or town—to superintendent of schools.
These agencies report to state department what they have done and transmit evidence.

State Director of School Plant Division, J. Fred Horn
Prepares plans for 1- to 6-teacher buildings, and suggestive sketches for larger buildings; advises school officials; checks architects' plans; makes school-building surveys upon invitation; visits local units upon invitation.

UTAH

Conditions reported uncertain

State Board of Education, Salt Lake City
There are two department building codes.
First is in abeyance though not exactly discarded.
They have operated under the second one 5 years.

State Superintendent of Public Instruction, C. H. Skidmore
Is required to formulate a code to govern preparation of plans by local communities.
May hire an architect to examine plans or inspect buildings.

VERMONT

State Board of Education, Montpelier
Public school buildings are standardized with "points" on buildings, grounds, equipment.
Plans "should be" submitted to state board.
Issues plans, pictures and bulletins.

State Commissioner, Francis L. Bailey

Other Agencies
Plans "must be" submitted to board of health.

VIRGINIA

State Board of Education, Richmond
Has a division of school buildings.
Prepares plans and specifications for smaller towns and cities.
Supervises construction free of charge.
Minimum standards have been set up and approved.
Cooperates with local boards in:
(a) Preparing preliminary plans.
(b) Getting out final plans.
(c) Attendance at opening of proposals.
(d) Inspection every 2 weeks during construction, additional upon request of contractor or local board.

State Superintendent of Public Instruction, Dr. Sidney B. Hall

State Director, Division of Buildings, Raymond V. Long

WASHINGTON

State Superintendent of Public Instruction, Olympia
Has been given "some power" through law on "wider use of school plant."

State Superintendent of Public Instruction, Dr. N. D. Showalter

Other Agencies
County superintendents approve plans in 3rd class districts.

WEST VIRGINIA

State Board of Education, Charleston
May require all plans and specifications for the erection of school buildings to comply with the requirements of law; and may require all county boards to submit all plans and specifications for the Board's approval.

State Superintendent of Free Schools, W. W. Trent

WISCONSIN

State Department of Public Instruction, Madison
Under a cooperative agreement between the industrial commission and the department, all school plans are sent to the latter by the commission for checking and suggestive criticisms looking towards the erection of first class buildings.
Helps local communities by making suggestive plans for all types of buildings to serve as a basis for extended work by commercial architects.
Service has been extended to cover expert advice on heating, ventilation, lighting.
The department develops complete plans and specifications and gives architectural service for 1- and 2-room rural schools on request.
Inspects all types of schools with a view to improving housing conditions and facilities; makes complete building surveys in all types of communities on request.

State Superintendent of Public Instruction, John Callahan

Other Agencies
The law requires submission of all school plans to industrial commission. This checking refers primarily to the application of the state building code and pays attention primarily to construction, safety and sanitation.

Supervisor of Buildings, H. W. Schmidt

WYOMING

Commissioner of Education, Cheyenne
He shall prepare for the use and guidance of the district board regulations and suggestions for standardizing and grading schools and for the hygienic and sanitary building of schoolhouses and the selection of sites.

State Superintendent of Public Instruction, Mrs. Katharine A. Morton

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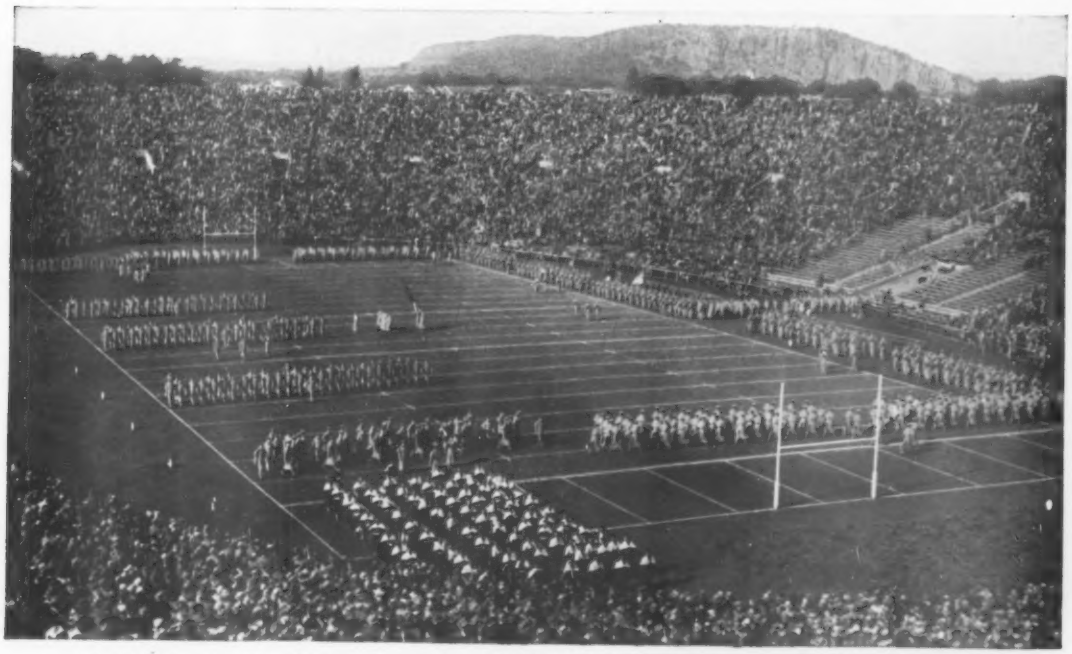

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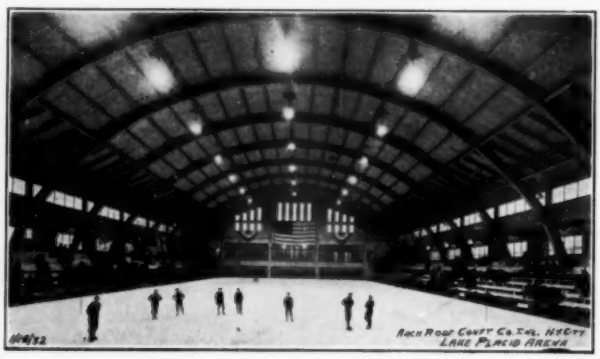

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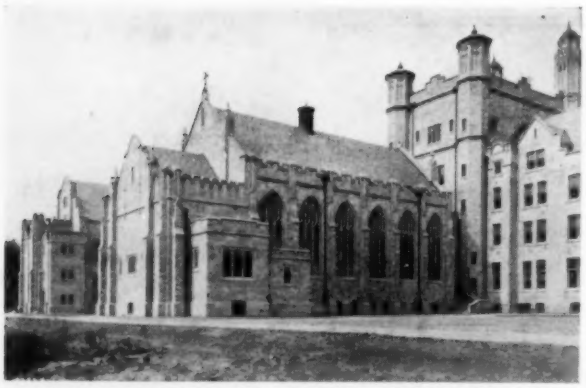

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